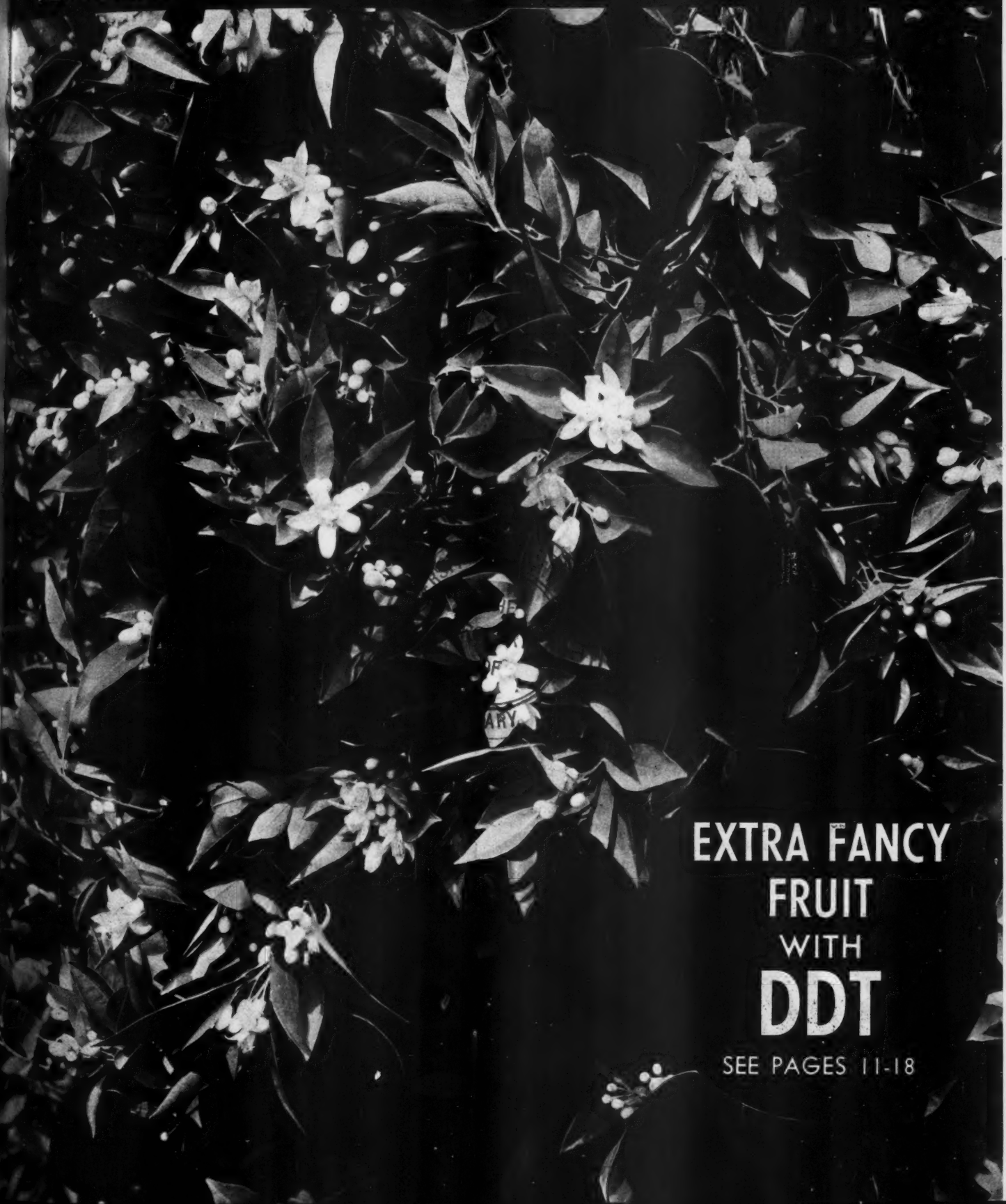


*American*

# FRUIT GROWER

FEBRUARY

1946

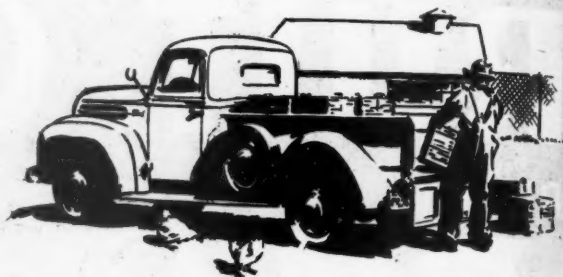


EXTRA FANCY  
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**DDT**

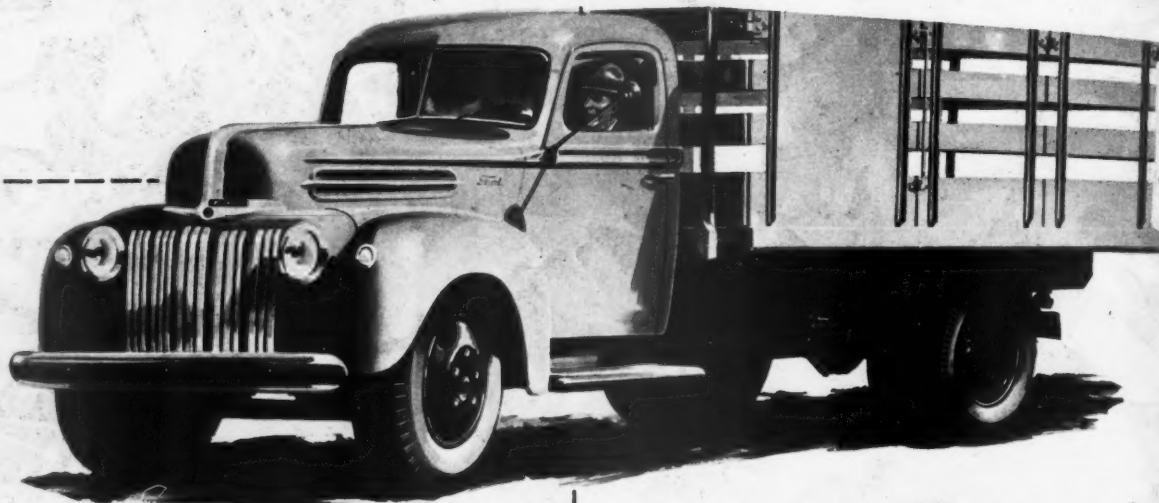
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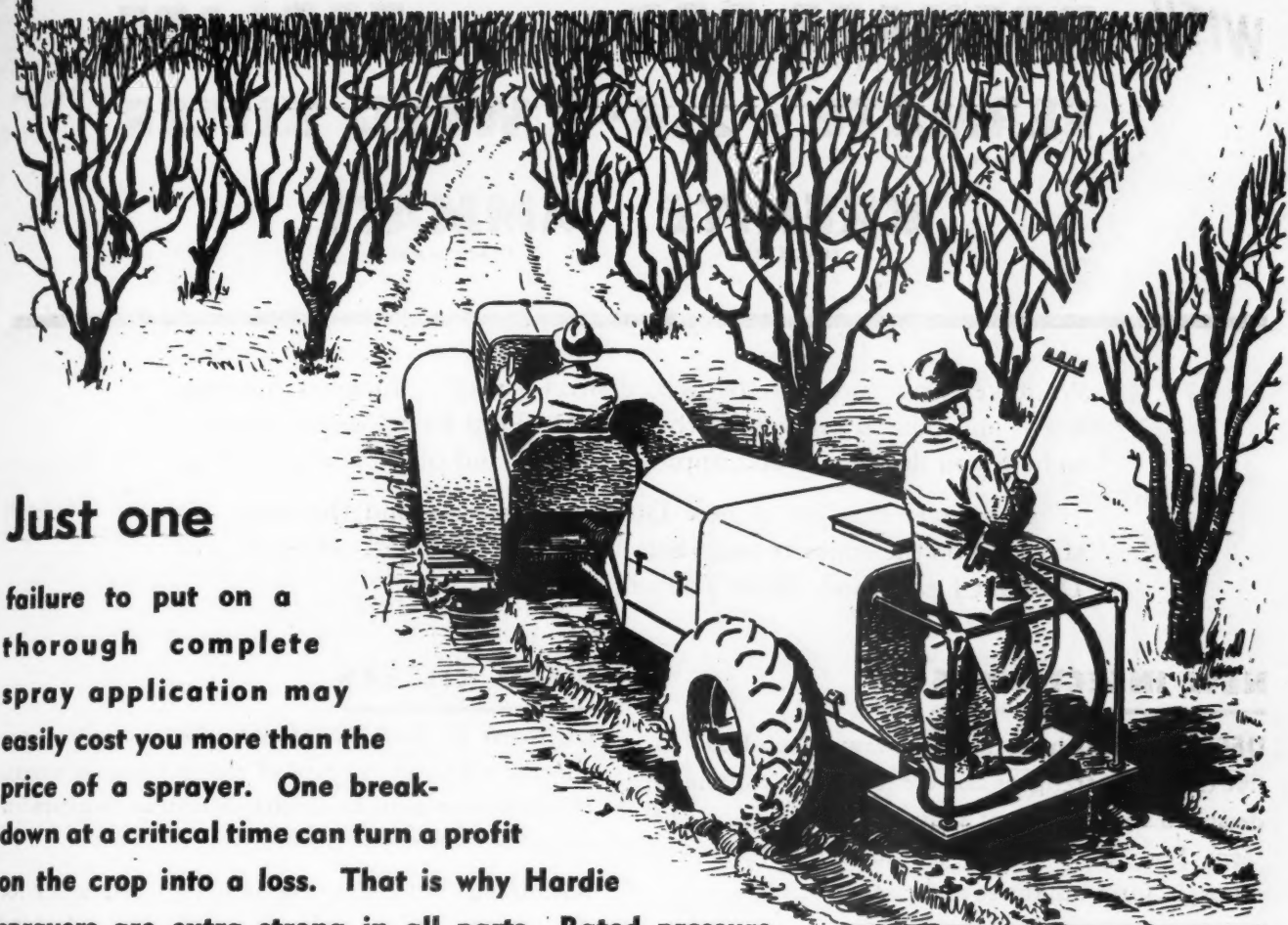


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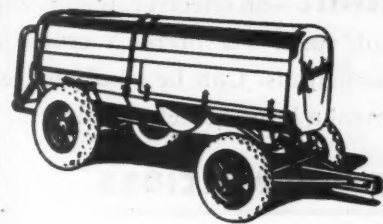
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To help you get the greatest benefits from Du Pont Pest Control Products, trained Du Pont agricultural servicemen are located throughout the country. For additional information about the use of any of these products in your community, see your local Du Pont Dealer or write direct to E. I. du Pont de Nemours & Co. (Inc.), Grasselli Chemicals Dept., Wilmington 98, Delaware.

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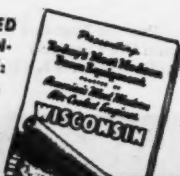
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VOL. 66 No. 2

FEBRUARY, 1946

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## AMERICAN FRUIT GROWER

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Timely spraying with Black Leaf 40 controls green and rosy aphids, bud moth and red bug, thus preventing deformed fruit and foliage. Black Leaf 40 can be combined with all standard sprays—is effective and not harmful to buds or leaves.

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## LETTERS TO THE EDITOR

### Blackberries and Blueberries

Dear Sirs:

I have a patch of Early Harvest Blackberries. This was the third year they had fruit on them. Each year some of the bushes had lots of berries but the berries did not ripen. They just turned red and remained in that stage until they dried up, while other bushes had berries that did not develop more than a half of a berry. Some other bushes were loaded with berries of good quality.

I have these bushes in a low place. I have two rows of Concord grapes in the same plot of land that did well this year. They were set a year ago this last Spring.

What do you think could be the trouble?

I have been reading about blueberries in your November issue. What would you advise about them in this part of the country and on this kind of soil?

Topeka, Kansas

James Coleman

The trouble with your blackberries sounds like anthracnose which often interferes with the development and ripening of berries. Apply to your state experiment station at Manhattan, Kansas, for control measures since they vary in different climates. Frost damage could also be the cause of your trouble.

Blueberries require an acid soil (pH 4.0 to 5.0) which is high in organic matter. They succeed best where the water table can be maintained at from 14 to 22 inches below the surface. At least during the spring months, it is desirable to have the water level in the soil about a foot from the surface. Soil drainage down to the water table should be good. Such favorable sites are rather limited.—Editor.

### Bermuda Grass

Dear Sir:

Is it injurious to peach trees to have Bermuda grass covering the ground beneath the trees in the orchard?

Charleston, Missouri Mary Lee Simpson

Bermuda grass makes a good cover crop but it must be disced under in the late summer. It should not be allowed to remain beneath peach trees without disking since nitrogen starvation would be likely to develop.—Ed.

### Cover Crops for Apples

Dear Sir:

As a subscriber I am taking the liberty of asking advice on a fruit growing problem. This spring I intend to plant out some Pippin and Golden Delicious apples. The soil is sandy loam that dries out quickly but at a depth of eight feet there is abundant water in a gravel strata. This land is now covered with a very rank growth of weeds so the soil must be good. I don't dare plow under these weeds entirely as the land sometimes is covered with flood water and the soil would wash away.

My problem is how can I properly cultivate the trees and still not expose the land to the danger of washing away. Should I just keep the natural weeds mowed down or would something like lespedeza protect the ground without stunting the growth of the trees? I would be thankful for any ad-

vice you may be able to give me on the subject.

Healdsburg, California C. R. Kirkpatrick

Your idea of keeping the soil covered with a cover crop is a very sound one. Since you mention that the area is sometimes flooded over, it may not be too good a location for setting apple trees. They are very sensitive to "wet feet." The other soil conditions sound very favorable for the growth of the trees, especially the normal water table and the well-drained soil. Should the soil be covered with flood water for any length of time during the growing season, severe damage might occur to the trees, even to the extent of killing them.

If you still want to plant your trees in this location, the best method of cultivation probably would be to cultivate them during the drier parts of the year and then grow a cover crop of some kind during the wet season. This will give protection to the soil when needed and at the same time conserve moisture during the dry season.—Ed.

### Training Boysenberries

Dear Editor:

I have planted a few rows of Boysenberries but am ignorant about how to train the vines and should appreciate it if you would state some pointers in your magazine. Especially about how many wires should be stretched and how high they should be from the ground. Also how to trim the vines.

Clayton, Missouri

H. Rotter

Boysenberries are trained to a two-wire vertical trellis. During March pruning, the canes are left about 5 or 6 feet long, or longer if very vigorous, and tied to the wires. New canes that arise at the ground surface in the spring are allowed to trail along the ground in the direction of the row. As soon as the canes have fruited in the summer, they are removed close to the ground and burned.—Ed.

### Pruning Fruit Trees

Dear Sir:

Reading your magazine and other magazines about pruning—some people are puzzled about when to prune. I think the best time to prune trees of all kinds is when the sap is down in the ground. That would make it for the North from November until the first of March; for the Central part of the U.S. about December and January or February 15, and for the South from December 15 until January 15, or any time they think the sap is in the ground.

Worley, Idaho

Anton Ahlberg

The best time to prune fruit trees is between November and March, at least in northern climates where a definite dormant season is evident. However, the sap of the tree is not in the ground or even in the roots during the winter or dormant season. The sap is in all parts of the tree at all seasons of the year. The movement of the "sap," however, may be greater during the active growing period of spring and summer. That is no doubt the reason why trees or vines should not be pruned in the spring after growth begins.—Ed.

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By means of radio communication a C-61 is directing the course of a PT-17 plane dusting Lake Patria, Italy in the NATOUA anti-malarial campaign at Naples, Italy.—Photos-Signal Corps.



An American soldier of a medical battalion uses a rotary duster to spread a larvicide on a stagnant pool at Nettuno, Italy for the control of the Malaria carrying Mosquito.

# DDT..FROM WAR TO PEACE

By R. R. HENDERSON, Madison, Maine

A MEMBER of the Japanese Peace Delegation, in Manila to see General MacArthur, retired to his room in the Rosario Apartment house his first night in the city. He felt much more secure than he had back in Tokyo. A cordon of U. S. Military Police was guarding the building.

With Japanese curiosity this member of the Peace Mission picked up a metal, bomb-like canister from the window sill and unscrewed a little gadget at the end. Whish-sh-sh-sh and the room was suddenly filled with the combined vapor of Dichloro-diphenyl-trichloroethane and Dichloro-difluoromethane. The only casualties from the contents of this bomb-like canister were the hundreds of mosquitoes clustered on the outside of the screen.

The first chemical with the jaw-breaking name is familiarly known as DDT, the new powerful insecticide introduced by our army during World War II. The second chemical is a volatile solvent used to dissolve the insecticide and force it out of the bomb under pressure.

Over 10,000,000 of these "insect bombs" were used by our army during the war. Similar bombs are now being

made for peacetime use. The contents of just one bomb holding about a pint would kill all the insects in 240 pup tents or in 50 giant bombing planes. A wall sprayed with the solution will kill flies lighting on it four months later. Clothes dusted with the dry powder will provide protection against body lice for a month even though the clothes are laundered weekly.

DDT has saved the lives of thousands of our fighting men. Malaria, dengue fever, dysentery, filarisis and typhus, all insect-borne, have taken a large toll of armies throughout all history. Things started the same way in World War II and at Guadalcanal, for every man put out of action by the Japs, ten succumbed to insects and the diseases they carried.

Dichloro - diphenyl - trichloroethane was first made in the laboratory way back in 1874 by a German named Othmar Zeidler. But it was 65 years before anyone knew it would kill insects. A Swiss chemical firm used it as a moth proofing agent for textiles and in 1939 it was successfully used to combat an invasion of Colorado potato beetles. Since then it has been found most potent against a long

list of insects.

The first 500 pounds of DDT manufactured in America were flown to Italy so urgent was the need. The new insecticide was credited with saving Italy and Sicily from an epidemic of typhus when over 2,000,000 persons were dusted to kill disease-carrying body lice. New hospital cases were cut from 60 to only 10 a day and not a single U.S. soldier died of typhus.

By 1944 manufacturers in this country were producing 2,000,000 pounds a month and a large portion (Continued on page 33)



A member of a U. S. Army dusting team at a camp at Heidelberg, Germany dusting newly arrived displaced persons with DDT.



Spraying to control codling moth in a Michigan orchard.

# DDT FOR FRUIT-INSECT CONTROL

By B. A. PORTER

United States Department of Agriculture  
Agricultural Research Administration  
Bureau of Entomology and Plant Quarantine

**W**HAT is the latest on DDT? Is it as good as reported? What fruit insects does it control? Now that it is available should I use it in my orchard? These and many other questions are being asked by fruit growers everywhere. This interest is not surprising; DDT has been widely publicized, and many incredible tales have been told about it; the material does possess remarkable qualities, and has been found extremely effective against a wide variety of insects. DDT is not, however, a perfect insecticide. Much remains to be learned about it, and many problems must be solved before it finds its ultimate place in the orchard program.

In the March 1945 issue of the *AMERICAN FRUIT GROWER* there was a general summary of current information on this new insecticide. Extensive work during the season of 1945 by State, Federal, and commercial entomologists has yielded much additional information on the value of DDT. We also have a clearer idea of its limitations and some of the problems that will be created and

must be solved if its use should become general.

## DDT Formulations

DDT requires processing, or "formulation," before it can be conveniently used for insect control. It does not mix readily with water, and some accessory material must be used with it. Grinding involves certain difficulties, since the material tends to soften and lump or pack. Many of these problems have now been met, and a number of satisfactory formulations are available.

For general orchard work, the most suitable type of mixture appears to be a water-dispersible powder containing 25 to 50% of actual DDT. Dusts containing various percentages of DDT have been used, but they are less effective against most orchard pests than liquid sprays. Solutions of DDT in oil or other solvents have been successfully applied in vaporized form, either from the ground with blowers or from planes or helicopters. These methods, however, have been applied chiefly against forest insects. Their place in

orchard-insect control has been investigated only in a preliminary way but they do not appear promising. Oil solutions of DDT, emulsified and diluted with water, have also been tested to a limited extent.

## Effect of DDT on Orchard Pests

The favorable results secured in 1944 with DDT against the codling moth were for the most part duplicated in 1945, in much more extensive experimentation. Although in many orchards in the Middle West and East, conditions were unfavorable to the codling moth and favorable to control with lead arsenate, DDT continued to show marked superiority over lead arsenate and other standard materials. Most of the work has been done with water-dispersible powders. In many cases  $\frac{1}{2}$  pound of DDT per 100 gallons gave much better control than 3 pounds of lead arsenate. The use of DDT at reduced strengths (4 to 6 ounces per 100 gallons) with lead arsenate, nicotine bentonite, or cryolite in about half the usual strength has also given good control.

DDT has also shown promise in limited tests against many other fruit insects, including the tarnished plant bug, which causes distortion or "cat-facing" of peaches, the oriental fruit moth, the rose chaffer, the pear thrips, several species of leafhoppers, and the Japanese beetle, both the adult beetles and the grubs in the soil. Tests against the grape berry moth, the apple maggot, the cherry fruit-flies, the peachtree borer, and some other insects affecting fruit trees have given conflicting results.

DDT, at practical strengths, seems to have little or no value against such important fruit insects as the plum curculio, the San Jose scale and other scale insects, and the pear psylla, and against several species of orchard mites.

## Effect on Fruit Trees

DDT seems to be fairly safe for use on fruit trees. Some injury has resulted from its application in oil emulsion, but the part played by DDT in the injury has not been entirely clear. Studies are now under way to determine the effect on orchard trees and cover crops of accumulations of DDT in the soil. Thus far, no sign of injury has been evident.

## DDT Limitations

As all growers realize, many factors other than effectiveness in insect control must be considered, before an insecticide can take its place in the orchard-insect control program.

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portant with such a powerful insecticide as DDT is its effect on beneficial insects that normally keep many of our insect pests within bounds. DDT has been found to have a very serious effect on many of the common insect parasites found in orchards. For instance, the oriental fruit moth parasite *Macrocentrus* may be killed if it merely walks once across a peach leaf that has been dusted with DDT.

Probably the most serious problem of this kind is the tremendous increase in the population of mites of various species that often follows the use of this new insecticide. At ordinary strengths DDT has little effect on the mites, but it does kill many of the ladybird beetles and other enemies that normally keep the mites within bounds. As a result, tremendous increases in mite populations have occurred in many of the tests conducted on orchard and shade trees and ornamental shrubs.

Although the mites do not destroy fruit directly, they devitalize the foliage, causing it to turn brown and dry, and to fall off. If this happens much before harvest, the fruit does not mature properly and the trees go into the winter in a weakened condition. If the use of DDT in orchards becomes general, mite control is certain to become a major problem, even in orchards in which growers have never previously realized that mites were present.

Other insects, ordinarily not troublesome in orchards, may also be increased by the elimination of their natural enemies. The woolly apple aphid has increased greatly in northwestern apple orchards following the use of DDT. Other pests are likely to become suddenly destructive with the elimination or reduction of natural control, when DDT is applied over large acreages.

A second problem is that of spray residues. DDT is definitely poisonous to warm-blooded animals, and some of its effects are not fully understood. On the basis of studies thus far, the U.S. Food and Drug Administration has established an administrative tolerance of 7 parts per million (about 0.05 grain per pound) for DDT residues on apples and pears. More recent information on the effect of DDT on warm-blooded animals has been less favorable than some that was reported earlier, and there seems little likelihood of a more liberal tolerance. Unfortunately, residues of DDT are very difficult to remove by any of the standard washing methods and effective methods of treatment have not yet been worked out.

A full-season program of six or more applications of DDT at a

strength of 1 pound per 100 gallons is likely to give residues considerably in excess of 7 parts per million, especially if applications are made close to harvest time. A program of ½ pound per 100 gallons plus oil in the later applications may also result in excessive residues. Schedules involving the use of DDT in the first-brood applications only, or with DDT throughout the season at reduced strengths (4 to 6 ounces per 100 gallons) with low strengths of lead arsenate, nicotine bentonite, or cryolite, should not cause excessive residues on winter apples, as long as oil is not used in the late applications.

## DDT in 1946

With the ending of hostilities, DDT has become available for commercial use. The extent to which a grower should use it in 1946 must depend on his particular situation. If the codling moth has been a critical problem, and lead arsenate has proved to be inadequate, the use of DDT has a strong appeal. Any grower considering a DDT program should, however, recognize the factors that have already been outlined.

First, the use of DDT is likely to be followed by serious outbreaks of orchard mites, unless other measures are taken to control them. Several

(Continued on page 32)

### DDT BATTING AVERAGE\*

	EXCELLENT CONTROL	POSSIBLE CONTROL	LITTLE or no CONTROL
<b>APPLE INSECTS</b>			
Codling Moth			
Plum Curculio			
Apple Maggot			
European Red Mite			
San Jose Scale			
<b>PEAR INSECTS</b>			
Pear Thrips			
Pear Psylla			
Codling Moth			
San Jose Scale			
Oriental Fruit Moth			
<b>PEACH INSECTS</b>			
Peachtree Borer			
Plum Curculio			
Oriental Fruit Moth			
Tarnished Plant Bug			
Japanese Beetle			
San Jose Scale			
<b>GRAPE INSECTS</b>			
Grape Berry Moth			
Grape Leafhopper			
Rose Chafer			
Japanese Beetle			
<b>PLUM INSECTS</b>			
Plum Curculio			
San Jose Scale			
Red Mite			
<b>CHERRY INSECTS</b>			
Cherry Fruit Flies			
Plum Curculio			

\*This list consists of the principal insects that have figured in DDT experiments. Inconclusive evidence does not permit listing additional fruit insects at this time.

American Fruit Grower Chart

Source—U.S. Bureau of Entomology and Plant Quarantine

# EXPERIMENT STATION RESEARCH WITH DDT

Horticulturists of the Northwest, West, South,  
Central and Northeast Sections of the  
Country report results of DDT Experiments

DDT on Ohio Apples  
By C. R. Cutright  
Ohio Agricultural Experiment Station  
Wooster, Ohio

THE fact that DDT will control codling moth has been well established during the past 2 years. This statement is qualified only by failure to observe procedures of good usage; namely, correct dosage, formulation, timing, and thorough application. Data to prove the claims of control are numerous and have been secured in practically every apple-growing section of the United States. As an example of such data, some summarized results secured in Ohio in 1944-45 are presented in Tables I and II on this page.

In this experiment it was proven that DDT, at dosages of 4 pounds of 25% material per 100 gallons of water, when applied at intervals of from 12 to 15 days, effectively con-

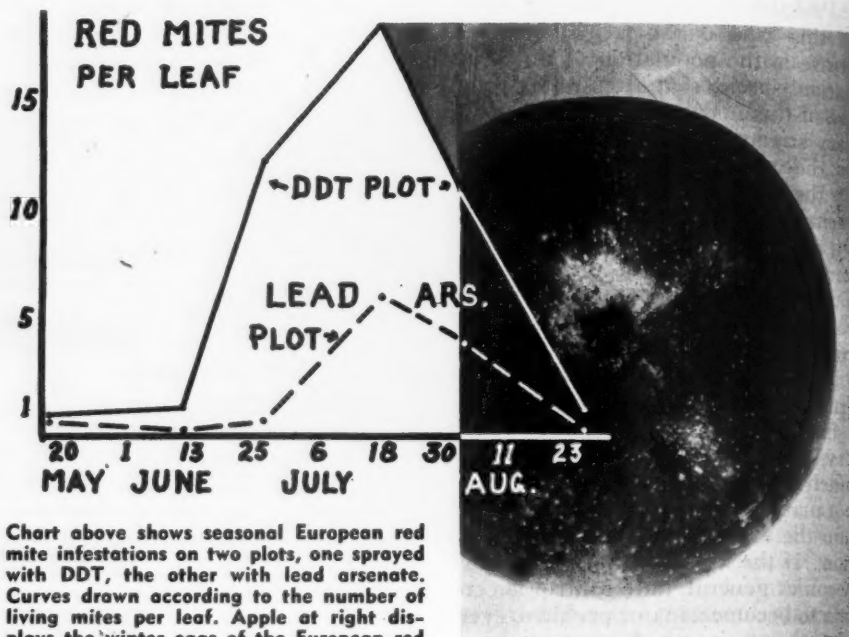


Chart above shows seasonal European red mite infestations on two plots, one sprayed with DDT, the other with lead arsenate. Curves drawn according to the number of living mites per leaf. Apple at right displays the winter eggs of the European red mite at the calyx end of the fruit.

TABLE I.—CONTROL OF CODLING MOTH WITH DDT.  
FRANK FARNSWORTH ORCHARDS,  
WATERVILLE, OHIO, 1944

Materials and schedule	Per cent wormy	Per cent stung
Lead arsenate schedule In petal fall and 7 covers.....	45	73
DDT, schedule 1 Lead arsenate in petal fall DDT, 4 pounds—25%, in 4 covers.....	21	24
DDT, schedule 2 Lead arsenate in petal fall DDT, 4 pounds—25%, in 7 covers.....	2	6

trolled codling moth in a very severely infested orchard. DDT, at the same dosage but applied at intervals of 21 to 25 days, was not particularly effective but was much better than lead arsenate, 3 pounds, in a schedule of petal fall and 7 cover sprays.

This experiment shows that DDT at 2 pounds of 25% in three sprays with lead arsenate in a six-spray schedule was not nearly as effective as DDT at the same strength used alone in a six-spray schedule. Good control was obtained with this small amount of DDT, while a schedule of 4 pounds of 25% material almost eliminated the codling moth.

It is felt that 2 pounds of 25% is hardly enough and 4 pounds is probably more than necessary. There-

fore, for growers who wish to experiment with DDT, 3 pounds of 25% material is suggested.

DDT when used against other orchard pests has given varying results. It is not effective against plum curculio; therefore, lead arsenate will continue to be used in the petal fall and possibly in the 1st cover or 10-day spray. Its effect on apple maggot in Ohio has not been determined and reports from other states are conflict-

ing as to its action on this pest.

DDT is very effective against the different apple leaf hoppers and will possibly replace nicotine as a control for these insects. It will probably also aid in controlling apple red bugs, though there may be some difficulties in timing such a schedule for effectiveness.

There are conflicting reports concerning the effect of DDT on the different apple aphids.

Against rose chafer, DDT gives promise of great advancements in  
(Continued on page 24)

TABLE II.—CONTROL OF CODLING MOTH WITH DDT  
SCHMITKONS BROTHERS' ORCHARDS  
LORAIN, OHIO, 1945

Materials and schedule	Per cent wormy	Per cent stung
Lead arsenate—oil Lead, 3 pounds, in petal fall and 7 covers Oil, $\frac{3}{4}$ gallon, in 2nd, 3rd, and 4th covers	17	34
Lead arsenate—DDT Lead, 3 pounds, in petal fall and 7 covers DDT, 2 pounds—25%, in 2nd, 3rd, and 4th covers	9	18
DDT schedule 1 Lead arsenate in petal fall and 1st cover DDT, 2 pounds 25%, in 6 cover sprays	3	8
DDT schedule 2 Lead arsenate in petal fall and 1st cover DDT, 4 pounds 25%, in 6 cover sprays	5	3

# GROWER EXPERIENCES WITH DDT

Fruit Growers of Indiana, Michigan, Ohio, Maryland  
and West Virginia discuss their experiments with DDT



the first use of DDT against codling moth in the United States. The first application was made after second brood infestation and third brood of codling moth was stopped absolutely.

"In 1944 the first commercial test of DDT against codling moth was made in this orchard. Under Dr. Steiner's supervision and with the Bureau of Entomology and Plant Quarantine furnishing the material, an eight acre area was sprayed, watched and checked all season against the surrounding area that was sprayed with Nicotine Bentonite. A 1:1 DDT-pyrophyllite mixture was applied in 10 cover sprays, the first 5 with DDT at 1 pound per 100 gallons and the last 5 at 3/4 pound. Eleven cover sprays were applied to the Nicotine Bentonite area between May 17 and August 23. The table furnished below gives the

Left—Speedsprayer applying DDT in a cooperative grower experiment in the Reed Orchards, Vincennes, Indiana. Photograph by L. F. Steiner, Bureau of Entomology and Plant Quarantine, U.S.D.A.

**M**EREDITH P. REED, of Vincennes, Indiana, has a 265-acre apple orchard located in the southwestern part of the state in the three brood codling moth area. In his own words, Mr. Reed tells of his experience of two years with DDT:

"During the past ten years, codling moth had increased to such an extent that despite the use of best known formulas, and ten to twelve cover sprays, we had about come to the conclusion that apple orcharding was an uneconomic business in this southern area. In 1944 the codling moth infestation was over 50 percent for the entire section.

DDT was first used in our orchard late in the summer of 1943 by Dr. L. F. Steiner of the Bureau of Entomology and Plant Quarantine. This was

SUMMARY OF INFESTATION DATA FROM LARGE SCALE TESTS IN THE REED ORCHARD AUGUST 24-31, 1945

Area	Acreage	Varieties <sup>1</sup>	Fruit examined on trees			Drops		
			Clean apples (%)	Injuries per 100 apples		Apples Per tree No.	Worms Per tree No.	Stings Per tree No.
				Worms No.	Stings No.			
A	38	G.T.R.W.S.J. Average	80.4	15.6	9.4	298	222	31
B	53	G.T.R.W.S.J. Average	92.4	3.9	4.9	212	81	15
C	51	J.T.R.W.S.G. Average	93.1	2.7	5.5	103	28	3
D	45	J.G.D.W.T.R.B.	91.3	3.8	5.7	81	24	2
C	Inside 8 acre block sprayed with DDT in 1944. Outside 8 acre block in 1944.	J.G.S.R.	96.0	1.2	3.1	----	----	----
		J.G.S.R.	92.3	4.6	3.7	----	----	----

<sup>1</sup> Abbreviations: G.(Grimes) T.(Turley) R.(Rome Beauty) W.(Winesap) S.(Starking) D.(Red Delicious) B.(Ben Davis) J.(Jonathan)

VARIETAL DIFFERENCES IN INFESTATION FOLLOWING A LARGE-SCALE COMMERCIAL TEST OF DDT AND TANK-MIX, NICOTINE BENTONITE, IN THE REED ORCHARDS IN 1944

Variety	Date of final picking	DDT			Nicotine bentonite		
		Worms per 100 apples on June 20	Season totals		Worms per 100 apples on June 20	Season totals	
			Clean apples	Wormy apples		Clean apples	Wormy apples
Starking.....	Sept. 9	3	64	24	10	28	67
Grimes Golden.....	Sept. 14	2	61	19	4	61	31
Golden Delicious.....	Sept. 16	2	61	16	5	61	31
Jonathan.....	Sept. 16	2	72	16	5	40	48
Rome Beauty.....	Oct. 19	3	76	12	9	37	58
Average.....		2.5	67	17	7	45	47

results for the 1944 season.

"In 1945 this orchard was designated by the Bureau as one for large scale testing and was divided for four separate spray treatments each of which was repeated in a different part of the orchard. The following spray formulas were used: Area A—10 cover sprays and 1 top-off (May 5 to Aug. 6). Nicotine Wyo. bentonite-soyol in 2; Nic.-Miss. bent.-mineral oil in 3rd and top-off; Nic.-sulfur in 4th; Nic.-Miss. bent.-sulfur in 5th and 6th; Nic.-Miss. bent. and oil in 7th to 10th (soyol in 7th, min. oil in others). 1 pt. Nic. sul. in all sprays.

(Continued on page 16)

# GROWER EXPERIENCES WITH DDT

(Continued from page 15)

"Area B.—10 cover sprays (April 30 to Aug. 7). 1.5 lbs. Deenate in all sprays—same as A for first 2; ½ pt. Nic. sul. in 3rd-10th sprays with Miss. bent. in 5, sulfur in 3, and mineral oil in the 3rd and 8th to 10th inclusive.

"Area C.—7 cover sprays (May 7-July 30). 6 lbs. Deenate in first 2, 4 lbs. in 3, and 2 lbs. in last 2. Weak bordeaux and mineral oil added to 2nd and 6th, oil and bentonite to 1st and 3rd, sulfur to 4th and 5th and oil with soybean flour and lime to 7th.

"Area D.—9 cover sprays (April 30-August 8). 4 lbs. lead arsenate to first 2, 2 lbs. in next 4. 1.5 lbs. Deenate in first 6, 2 lbs. in last 3; weak bordeaux in 2nd to 8th inclusive except for sulfur substituted in part of 5th. Mineral oil in all sprays except 6th and part of 5th. The results of these tests for the season 1945 are tabulated in the chart on page 15."

## Friday Orchards

George Friday of Coloma, Michigan, past president of the Michigan State Horticulture Society and fruit grower with 280 acres of apples of different ages from 15 to 40 years of age and ranging in season from Yellow Transparent to winter varieties, experimented with DDT in his orchard in 1945 and now reports the results:

"Our experiments for the codling moth season of 1945 in one of our orchards included the two major items, arsenate of lead and DDT.

"This experimental work was started after a calyx and one cover spray of arsenate of lead had been applied. After that nine sprays were applied at an average of nine day intervals. The entire orchard was sprayed each time on both sides in the same day and about twenty gallons of material were applied to each tree. Trees were about twenty years of age. The men spraying sprayed by number and did not know what the different numbers were.

"There was a light crop of apples this year and adjoining this orchard we had an orchard of Spies which we did not spray on account of the light crop. There were some apples in this orchard all of which were fully inhabited by the worms, as many as each apple would hold which made a very bad condition for the experimental orchard.

"The outstanding thing in the experiment was the fact that codling

moth are only killed by arsenate of lead by eating some of the poison, and in the second brood especially that usually means a sting on the apple. While with DDT, the killing is by contact and therefore leaves the apple perfectly smooth. In any reasonable well-sprayed orchard with arsenate of lead you always have many stings for every worm that actually gets into the apples. Even if DDT did not control worms any better than arsenate of lead, where there is a serious infestation you would still have a very much higher grade of apples with DDT than with arsenate of lead. In packing these apples a very large percentage of the arsenate of lead sprays had anywhere from one to twenty-five stings on an apple. While in the DDT plot there were only a very small percentage of apples that showed stings and almost no worms and we had at least one

Below—Spraying in the Mantle & Mantle Lake Erie Orchard, Painesville, O., where in all orchard plots sprayed with DDT in 1945, codling moth control was perfect.

Below center—George Friday, fruit grower, with 280 acres of apples, from Coloma, Michigan, packed twice as many bushels of apples per tree from DDT-sprayed plots than from plots sprayed with other materials.



tree in the orchard containing at least nine or ten bushels of apples sprayed with DDT, on which they did not find a worm or sting. All DDT plots were sprayed with ½ pound of actual DDT per 100 gallons of water. In addition to this there was a considerable infestation of aphids both rosy and green in this orchard this year, which caused many small apples. As we picked these apples, due to the aphid apples, there were an average of over 300 apples per crate on the arsenate of lead plot and on the DDT plots there were very few crates that contained over two hundred apples as they came from the trees. When we packed this fruit there were so many stings on the arsenate of lead plots that we could not pack them utility grade due to the fact that that grade only allows five stings per apple and we had to pack same unclassified. While on the DDT plots there were so few stings that we packed them combination, No. 1 and utility. The only reason for doing that was that such a large percentage of the apples were on the inside of the trees and were light in color on both plots. We actually packed twice as many bushels per tree from the DDT plot as we did from the arsenate of lead plots. And the fruit was two grades better.

"There was a definite increase in red mite on the DDT plots where there was nothing used to combat the red mite. One plot ran as high as 55 red mite per leaf by the latter part of August. While the arsenate of lead plots were mostly below twenty. With the addition of summer DN 111, in three sprays, this population

(Continued on page 41)

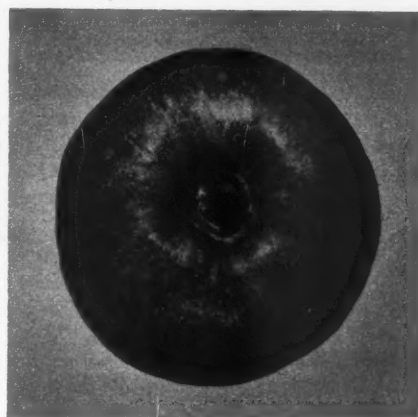
# SUGGESTED DDT SPRAY PROGRAM For Codling Moth Control

By W. S. HOUGH

Winchester Research Laboratory of the  
Virginia Experiment Station

THERE is no doubt that DDT is effective in controlling the codling moth; in fact, it is the most outstanding insecticide for codling moth control that the writer has used during twenty-four seasons of work with this insect. The spray program for apples is largely based on requirements for codling moth control beginning with the calyx or petal-fall spray. It would seem, therefore, to be an easy matter to write a spray schedule for apples using DDT as the insecticide instead of lead arsenate in the codling moth sprays. But the fact is that DDT has not been used for a sufficient length of time to enable anyone to recommend a completely reliable spray schedule for use in apple orchards. The complexity of the problem is due to the efficiency of DDT in destroying so many insects, the beneficial as well as the harmful individuals.

DDT appears to be safe on apple trees and no evidence of incompatibility or injury to fruit or foliage has come to our attention when powder formulations were used with any of the following spray ingredients: wettable sulfur or flotation sulfur, lime, zinc sulphate plus lime, Bordeaux mixture, or lead arsenate. DDT in powder formulations has also been used with lime sulfur and with summer oil but the toxicity of DDT to



The visible residue from powder formulation of DDT was not removed from the stem end when the fruit was brushed.

codling moth may be decreased by the use of either of these materials. In the case of oil, however, the ovicidal value of the oil may offset any loss in toxicity of DDT. In laboratory tests wettable sulfur also lowers toxicity of the DDT spray but in actual practice this has not been an important factor. Fermate has been used with safety in one application, but A. M. Woodside of the Virginia Experiment Station reports that severe defoliation followed five sprays of DDT plus Fermate.

Before suggesting a DDT spray

Visible residue may persist from heavy applications of some powder formulations of DDT. Appearance of deposit is noticed on fruit at left before brushing, at right after brushing. Last spray was applied more than one month in advance of picking.

program for codling moth control we need to consider two items of importance: first, its effect on orchard pests other than the codling moth; and second, the spray residue problem.

Various reports indicate that DDT is not effective against the curculio and there is the possibility that woolly apple aphids may increase by reason of destruction of their natural enemies. Experience of the past two seasons indicates a direct relation between the use of DDT on apple foliage and the prevalence of mites. In 1944 mites became sufficiently abundant on the sprayed foliage to bronze the leaves severely, while trees not sprayed with DDT had almost no mites. In 1945 adverse seasonal conditions depressed mite development until the second week in August, consequently severe bronzing did not occur. A careful examination of the leaves in late August, however, revealed a mite population approximately seven times greater on the foliage of trees sprayed with DDT than occurred elsewhere in the orchard. The mites were just as numerous on trees sprayed through the season with 4 ounces of DDT per 100 gallons of spray as with 1 pound of DDT per 100 gallons. Increasing the concentration of DDT to 1½ pounds per 100 gallons failed to suppress mite development on trees sprayed for control of mealybugs. In Virginia two species of mites are involved, the European red mite and the apple mite (*Tetranychus schoenei* McG.).

The following materials listed in the order of their effectiveness reduced the mite population in the DDT-sprayed plots to near the level or below the level of the populations occurring on trees sprayed with lead arsenate: DN-Dry Mix at 2/3 pound, DN-111 at 1¼ pounds, and Genicide at 1 pound per 100 gallons. These materials were used with the DDT

(Continued on page 35)

## SUGGESTED DDT SPRAY PROGRAM FOR CODLING MOTH CONTROL

SPRAY APPLICATION AND TIME	MATERIALS FOR 100 GALLONS (Amount of DDT refers to actual DDT in powder formulations)
<b>FIRST SPRAY</b> About 2 weeks to 17 days after petal-fall stage.	DDT 1 pound and sulfur fungicide, preferably flotation sulfur at usual strength.
<b>SECOND SPRAY</b> About 10 days or 2 weeks after the first spray.	DDT ¾ pound. If mites appear, add (DN-111) 1¼ pounds or Genicide 1 pound.
<b>THIRD SPRAY</b> About 10 days or 2 weeks after the second spray.	DDT ¾ pound. If fungicide is needed, use Bordeaux mixture at usual strength.
<b>FOURTH SPRAY</b> About 10 days or 2 weeks after the third spray.	DDT ¾ pound. For mite control add (DN-111) 1¼ pounds or Genicide 1 pound.
<b>FIFTH SPRAY</b> About 3 or 4 weeks after fourth spray.	DDT ¾ pound. For mite control add (DN-111) 1¼ pounds or Genicide 1 pound.



## Machinery for Applying SCAB CONTROL SPRAYS and DUSTS

By A. B. BURRELL, Cornell University

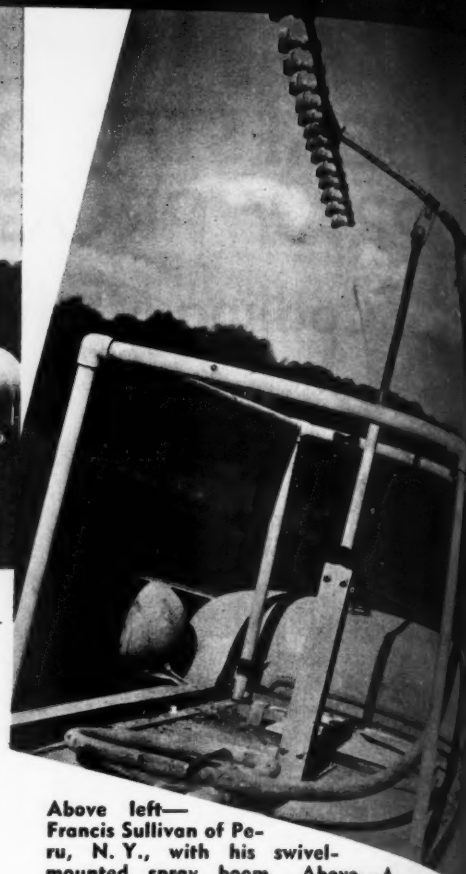
**T**HE January issue of the *AMERICAN FRUIT GROWER*, carried an article on the choice and timing of sulfur sprays for apple scab control. Organic fungicides were not discussed, because they are in the experimental stage, except for Fermate (ferric dimethyl-dithio-carbamate). The latter is similar to the elemental sulfurs, in scab control, but is too expensive to use except where some additional disease or a compatibility or injury problem is involved. The most notable case is where a combined spray for scab and cedar rusts is needed in the period just before, during, and just after bloom. For this purpose  $\frac{1}{2}$  pound to 1 pound of Fermate plus 6 pounds of a flotation sulfur paste, or 3 to 4 pounds of a dry wettable sulfur, per 100 gallons, is a good combination, much superior to sulfur alone against rusts, and cheaper than Fermate at the strength ( $1\frac{1}{2}$  pounds in 100 gallons) that would be needed for scab-susceptible varieties. Fermate alone, at 1 pound in 100 gallons, may give adequate scab control on varieties less susceptible to scab; this strength is fully adequate for control of cedar rusts. Substitution of Fermate for sulfur in certain sprays, sometimes decreases the amount of russet on Golden and Red Delicious. Fermate and copper are both superior to sulfur in control of certain other fruit diseases.

But no matter what materials are

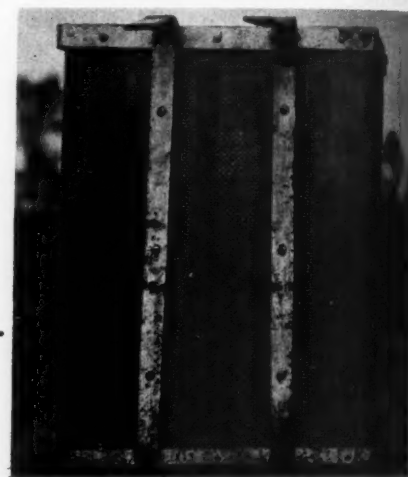
chosen, or when they are applied, if success is to be attained, a wise choice and efficient use of machinery must be made. A good start will be to consider the coverage job the machinery will need to do. The job required for scab control is different from that for the control of certain other diseases and insects.

In the early part of the year, when success or failure in scab control is largely determined, the foliage is not

This outfit used in the Forrence Orchards, Peru, New York, has a removable fine screen inside a supporting meshwork.



Above left—Francis Sullivan of Peru, N. Y., with his swivel-mounted spray boom. Above—A swivel-mounted, 16-nozzle spray boom on top of the spray tank. The vertical rod that carries the boom turns in a pipe, and the strap-iron gun-holder pivots on a bolt.



This deep screen fitting into the top of the spray tank aids in getting flotation sulfur and other materials into suspension rapidly.

extensively enough developed to make coverage as difficult a problem, as later. Even after foliage has become heavy, the coverage requirements for scab control are not quite so exacting as for control of some diseases or insects. For example, it is not essential to cover the lower surfaces of mature leaves for scab control. They remain susceptible longer than the upper surfaces, but spores perhaps lodge on them less frequently. The infection of lower leaf surfaces occurs chiefly while the leaves are unfolding, hence are fairly easily reached by spray, though late season infection from conidia does

**AMERICAN FRUIT GROWER**

occur.

Successive sprays are to protect new growth. During the primary scab infection period, growth of leaves is so rapid that if a rain is expected, a spray or dust may be required only 2-4 days after a previous one. In sprayed or dusted trees, the most scab usually is found in the top, especially the top-center. This is because of a lighter original deposit of fungicide and the fact that washing and splashing of sulfur during rains carries it downward, thereby giving partial protection to new foliage below, as pointed out by Dr. J. M. Hamilton of the Geneva Experiment Station. Fruit growers could make more use of re-distribution by aiming more of the materials into the tops, and in some cases, by increasing the number of pounds of sulfur per 100 gallons, or by spraying or dusting more heavily. By these means, the duration of protection from a particular application might be extended somewhat.

From the discussion of coverage, it is apparent that speed in covering the orchard is desirable, and that much scab spraying can be done from the top of the tank or a tower, underneath coverage not being essential. It is important, however, that every leaf shall receive spray or dust; this may require special procedures on large or dense trees.

The foregoing remarks on rate of coverage are in general terms. As a partial criterion of speed, it is suggested that with a conventional sprayer, the rate of delivery should be at least 200 gallons per man hour.

Right—Two fruit growers watching the air-blast sprayer: at right, Harold Weaver of Hudson, N. Y., owner of the machine; at left, Claude Bailey of Burnt Hills, N.Y.

Below—an air-blast sprayer, showing the discharge mechanism which is in constant up-and-down, rocking motion. The spray comes out of the three vertical rows of nozzles. Control levers are on tractor.

Below right—An experimental machine designed to apply either dust or spray, or the two together, as described by L. M. Massey and C. E. Palm of Cornell University in Oct. 1944 issue of Farm Research.

In other words, if one man is driving and another spraying, they should put out a minimum of 400 gallons per hour. If one man is driving and two are spraying, they should put out a minimum of 600 gallons per hour. Some growers evidently apply more than this. The figures are full-year averages, however, including good days and bad, and time spent in filling, hauling and repairs, as well as actual spraying. Have you figured your rate of spraying on this basis?

A survey of growers who spray rapidly for scab control probably would show that most of them have rather large capacity sprayers in good repair, use discharge equipment to utilize the full capacity of the pump, have arrangements to fill the tank and go back and forth to the trees to be sprayed without excessive consumption of time, and spray while riding.

The choice of equipment will vary with the situation. The "lay of the land," available manpower and motive power, and personal likes of the grower, will have much to do with the decision.

Favorable showings have been reported for stationary outfits. However, few eastern orchards are so

equipped, and there would appear to be certain disadvantages. By the time the tops of large trees are well covered from the ground, the lower branches are likely to be overloaded, and it would seem that coverage adequate for scab-control could be achieved more rapidly from a more elevated position.

#### Attachments to Standard Spray Equipment

In the Lake Champlain area of New York where 80% of the trees are of the scab-susceptible variety McIntosh, and are not very large, most of the acreage is sprayed with multiple-nozzle, horizontal booms on swivels.

The one-man outfit (see picture) with which Francis Sullivan has produced clean fruit on 60 acres of bearing orchard for 5 or 6 years consists of a 35 gallons per minute pump, driven by an old automobile engine, a 400 gallon tank, and a "doodle-bug" tractor on which a 16-nozzle boom is mounted. While driving, Mr. Sullivan operates the boom, which can be placed in the standard

(Continued on page 37)



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Photo by "Dick" Whittington

# NATIONWIDE FRUITS

## CITRUS

### Thirty Years in Citrus

Over a thirty-year period, the average production of citrus fruits increased a little more than 7-fold, and the farm value of the crop marched apace. American growers sold the expanded crops for a little more than 7 times as much as they did the earlier crops.

This is one of the highlights in one of the wonder stories of American agriculture—and of industry and nutrition as well—as it appears in the Crop Reporting Board records that date back to 1909, as compiled in 40 pages of tables made public by the U.S. Department of Agriculture. For the five crops from 1939 to 1944, the average production was a little less than 6,000,000 tons compared with an average of about 850,000 tons for 1909 to 1914. Values increased from roughly \$30,000,000 to about \$225,000,000 as annual averages for the two five-year periods.

Grapefruit, the report points out, did not become commercially important until later than oranges and lemons.

In the five-crop period beginning in 1909, grapefruit production was only about one-tenth as great as orange production, but in recent years grapefruit has gained and now equals about half the orange tonnage. The first 10-million-box crop of grapefruit was in the 1928-29 season, but in 1943-44 grapefruit production was more than 55 million boxes, and about half of this was processed.

The processing record is a story of industry as well as agriculture, and of wartime need for citrus products with their high dietary value in supplying vitamin C. Until the "thirties," says the report, less than five percent of any orange crop was processed. In recent years processing has averaged about 15 percent of production—considerably less than grapefruit, however.

## PEARS

### Bureau on Year-Around Basis

For the first time since the inception of the Oregon-Washington-California Pear Bureau in 1931, the entire personnel of this organization has been placed on a year-around basis. This new move is part of peace-time plans for greater development and expansion of The Bureau's service capacity to trade and public.

Formerly, the field promotion service of The Bureau was set up on a seasonal schedule, with mobile representatives moving about from market to market during the shipping period, from fall to spring. Now Bureau representatives will be permanently on duty the full twelve months of the year in allocated areas—engaging in long-range research and promotion during the off-season months and swinging into direct sales promotion during the shipping season as a specific aid to new-crop distribution. It is felt that the closer coordination of interests made possible under the new arrangement will result in added benefit to all trade factors, as well as to the ultimate consumer.

AMERICAN FRUIT GROWER

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Of paramount importance on the agenda of long-range activity will be furtherance of scientific winter pear "conditioning," a process of pre-ripening first introduced by The Bureau about eight years ago. "Conditioning" is credited by Bureau officials with a large share of the 47 percent increase in domestic winter pear consumption recorded during the years of World War II. Its success to date, too, is regarded as a true indication of the ready consumer acceptance and vast potential market awaiting wider distribution of the pre-ripened fruit.

### Right Storage Needed

To have good Delicious apples on the consumer market—those that are crisp and juicy—they must be "full of life" when shipped. According to fruit storage specialists of the U. S. Department of Agriculture's research administration, the apples should be segregated and treated on the basis of their condition at harvest time, and in accordance with how long they are going to be kept before the retailers get them.

The Delicious is an apple that pays big returns for careful storage, for one thing, rapid cooling to 30° F. Holding in storage at too high a tem-

perature greatly shortens storage life.

Edwin Smith and Fisk Gerhardt, who carried on these storage tests on Delicious in the Northwest, say the longer the storage time is to be from picking to eating the better the care they'll need. This means prompt and rapid cooling to the lowest safe temperature for fruit to be held in storage two months or more.

The Delicious apples marketed in October and November are likely to have the qualities to please the consumer even though they are not kept under as low temperatures as are necessary for successful long-time storage. Much refrigeration capacity is wasted on fruit that is to be marketed soon and doesn't need it. But apples to be offered the consumer in January and February, and to a lesser extent in December, require prompt movement into storage and good refrigeration all the way through to delivery day. This is particularly true if they were picked thoroughly ripe. Otherwise a lot of mealy and even shrivelled Delicious come on the retail markets in middle or late season.

Smith and Gerhardt say their results indicate it is "just plain horse sense" to treat apples as separate lots based on conditions at the start and on when they are expected to reach the consumer. Mass treatment, they say, is mismanagement.

frass sandy loam. The following cover crop systems are established: Rye plus vetch; soybeans (summer) with rye plus vetch (winter); soybeans with crimson clover; and soybeans with rye grass.

Broiler manure is substituted for sodium nitrate in combination with clean cultivation and rye plus vetch cover crops. Each cover crop is given an application of fertilizer recommended for the crop at the time of planting and a check plot is maintained for each cover crop system.

At the present time, the plots planted to soybeans (summer) with rye plus vetch (winter) are the only ones showing a significant increase in tree size. Soybeans with rye grass plots are significantly smaller than the check plots. The substitution of broiler manure for sodium nitrate on rye plus vetch plots caused no difference in tree size. The various cover crop fertilizers have not produced any significant variation.

### Grafted Grapes Prove Superior

Grapes grafted on vigorous rootstocks usually are more productive and vigorous than when the same variety is propagated by cuttings, according to Dr. George D. Oberle, pomologist at the State Experiment Station at Geneva, New York, who cites results of tests with grafted grapes carried on by the Station for more than forty years.

A shortage of grafted vines and their greater cost has thus far held up the use of grafted grapes on a commercial scale. Results of experi-

(Continued on page 34)

## PEACHES

### Cover Crops for Peaches

In discussing cover crops for peaches, A. W. Kenworthy of the Horticulture Department of the University of Delaware outlined the studies that are being conducted at the University substation in Georgetown, Delaware. The peach trees used for the project are now four years old and are planted on a Sassa-



Above—Wendell Hobbs of Burt, Niagara County, N.Y., and the daughters of three of his pickers line up baskets of Red Astrachan apples to be hauled to the packing house for grading and washing.—U.S.D.A. Photo by Madeleine Osborne.

Right—Grapes are being hauled from a vineyard to a highway where they are loaded onto trucks and taken to the winery.



# GENERAL CHEMICAL DDT PRODUCTS

with Sound Values  
...from Experience



**DURING THE WAR** General Chemical's DDT found its way to all corners of the earth. Now in its peace-time job—in various new insecticide formulations—it will go into orchards and farms all over America. For General Chemical as a major producer of DDT—and as the nation's foremost producer of insecticides—naturally took an early and continuous part in the intensive DDT investigational work that has been carried out by government and private organizations. Out of this work have come certain determinations regarding physical forms, specific toxicities and compatibilities with other chemicals.

General Chemical Company, accordingly, offers a line of DDT Spray and Dust Materials that are the result of broad studies and investigations in the laboratory and in the field—and backed by nearly 50 years' experience in producing insecticides plus a long and close association with growers in their uses.

• • •

**RESEARCH RESULTS** show that as DDT was used during 1944 and 1945 on apples it proved a very good control for codling moth, but failed as a control for curculio as well as mites. The research

results further show good control of Japanese beetle, leaf hoppers and apple redbugs, also Oriental fruit moth on peaches as well as berry moth, leaf hopper and rose chafer on Eastern grown varieties of grapes. DDT gave good "kill" of certain other insects that attack fruits and is under test for still others. Results of tests on potatoes show DDT a very good control for Colorado potato beetle, flea beetle, leaf hopper and psyllid. The field tests indicate that the list of vegetable pests controlled successfully by DDT will be enlarged after further field work. On shade trees and ornamentals tests show that DDT kills many common defoliating insects, including Japanese beetle (also grubs in turf), canker worms, tent caterpillars, catalpa sphinx worm, gypsy moth, elm leaf beetle, sawflies, white pine weevil, locust borer, locust leaf miner and boxwood leaf miner. Sucking insects such as leaf hoppers, tree hoppers and spittle bugs, all of which attack ornamentals, are also killed by DDT. On farm animals and in dairy barns, outhouses, mills, dwellings, also food processing, storing and dispensing buildings, DDT insecticides, when properly compounded, have proved very useful in control of most common pests (flies, mosquitoes, cattle lice, roaches, bedbugs, fleas, ants, clothes moths, silverfish, carpet beetles and certain other insects).

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## GENICIDE<sup>®</sup>-A

### FOR CODLING MOTH & MITES

DDT-bearing *Genicide* is now offered to apple and pear growers as the best combined control for codling moth and mites, in line with healthy foliage and good fruit finish. The new product is known as *Genicide-A*, and combines DDT with the basic organic chemical, *Genicide*, a development of General Chemical Research.

*Genicide* has a background of several years of research, and has been orchard tested from coast to coast for control of codling moth and mites. Recent work by experiment station investigators—utilizing *Genicide* in the DDT codling moth program—has proved the value of *Genicide* as a mite control. This work has also shown that the use of DDT alone in the codling moth spray program can result in severe build-up of mites, and costly damage, from mid-season to harvest.

*Genicide-A* is started in about the third first-brood cover spray in the DDT codling moth program. It gives the grower a continuation of DDT protection and in addition protects against mite damage . . . and at the same time removes the fear of injury to foliage or fruit. See your Orchard Brand dealer or write for particulars as to when and how to use *Genicide-A* for combined control of codling moth and mites.

**COMPATABILITY:** *Genicide-A* and *Genitox S50* are compatible with all commonly used copper and sulfur fungicides.

## GENITOX<sup>®</sup> S50

Contains 50% DDT<sup>†</sup> milled with a carrier that was selected after extensive laboratory and field tests. *Genitox S50* is of ultra-fine particle size, is readily wettable and has shown no tendency to agglomerate in spray tanks, whether in very hard or very soft waters. *Genitox S50* will cover fruit and foliage exceptionally well without excessive run-off. *Genitox S50* is recommended in preference to a 25% DDT material because it is effective and more economical, and it is not likely to interfere with fruit color.

A very versatile insecticide, *Genitox S50* is adapted for spraying apples, peaches, potatoes and certain vegetables where DDT is approved or recommended by state experiment stations. It is also the most economical form of DDT for spraying barns, cattle, food processing plants, storage buildings, ships, bunk houses, etc. for control of flies, lice, bedbugs, roaches and stored-product insects.

**FOLLOW ADVICE OF LOCAL EXPERIMENT STATIONS:** The grower should be guided in the use of DDT insecticides by the advice of Federal or State authorities. And he should use only the DDT materials he knows he can rely on for scientific and uniform compounding.



**Genitox<sup>®</sup> D-50** A 50% DDT powder intended primarily for manufacturing use in the preparation of agricultural dusts and household insect powders. Its carrier was selected for its dusting efficiency, also for its ability to combine easily and well with other DDT carriers as may be used by dust mixers or compounders of insect powders.

**Genicop<sup>®</sup> Spray Powder** A combined Insecticide-Fungicide of outstanding merit that offers the grower high spray efficiency, economy and time-saving convenience. *Genicop Spray Powder* is a concentration of DDT and Neutral Copper—no carrier. It is of exceptionally fine particle size and is put into the spray tank right from the package. Designed particularly for potatoes, this spray powder will find uses on other crops. *Genicop Spray* will control early blight, late blight, potato beetles, flea beetles, leaf hoppers and psyllid. It will show the way to high yields of potatoes.

**Genicop<sup>®</sup> Dust Base** A finely milled, intimately combined DDT-Neutral Copper Concentrate, containing no clay or other carrier. *Genicop Base* is intended for the compounder of DDT-Copper Dusts, and offers important advantages in economy, convenience and uniformity of finished products. Dust mixers are invited to write for particulars, formulations, technical information. State dusts now being made, crops, pests, etc.

**Genicop<sup>®</sup> 3-6 Dust** A DDT-Neutral Copper (combined Insecticide-Fungicide) Dust, primarily for the potato grower; smoothly blended for ideal dust coverage. Contains 3% DDT and 6% Metallic Copper. Controls early and late blights, potato beetles, flea beetles, leaf hoppers and psyllid. Field tests have shown outstanding increases in potato yields.

**Genidust<sup>®</sup> D-10** A fine-flowing powder containing 10% DDT, intended for use as a louse powder and flea powder on dogs and some other animals, also as an insect powder for roaches, bedbugs, ants and certain other pests found in homes, hotels, camps, ships; or in places where foods are stored, cooked or dispensed.

**Genidust<sup>®</sup> D-5 and D-3** Agricultural dusts of 5% and 3% DDT content respectively. Both dusts are made fine and free-flowing for maximum dusting efficiency. Intended for crops on which the use of DDT is approved or recommended by State experiment stations or Federal agencies.

**Genitol<sup>®</sup> EM-25 Barn and Mill Spray** An oil base 25% DDT emulsifiable spray. (For use with water.) Is adapted for use in small hand sprayers as well as larger types. Controls flies, mosquitoes, bedbugs, roaches and certain other insects found in barns, mills, warehouses, ships, bunk houses; also in food packing, storing or dispensing buildings, etc.

**Genitol<sup>®</sup> Oil Concentrates** For the compounder of fly and mosquito sprays or residual type oil sprays; also for the pest control operator or other large users of such sprays in buildings such as enumerated above, General Chemical offers several highly concentrated DDT oil base materials. Write to us for specific information about these concentrates, the various solvents they may be mixed with to make ready-for-use sprays, and other pertinent data.

\*Trade Mark, General Chemical Company

\*\*Reg. U. S. Pat. Off.

†Technical Grade

## GENERAL CHEMICAL COMPANY

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Sales and Technical Service Offices in Principal Distributing Centers

# EXPERIMENT STATION RESEARCH WITH DDT

(Continued from page 14)

control. Each and every kind of fruit that is attacked by this pest must have special study as to the necessary adjustments needed when DDT is introduced into the spray program. For example, special care must be taken not to poison bees that are working red raspberry blossoms at the same time that the rose chafer is feeding.

DDT has the advantage of being compatible with most of the other insecticides and fungicides. However, a great deal of experimental work is still necessary in this field.

The most serious drawback to the use of DDT on apples, and it is really serious, is the tendency for trees sprayed with DDT to develop heavy infestations of European red mite. This is clearly illustrated in the figure on page 14, where mite populations in terms of mites per leaf are shown on a plot sprayed with DDT, as compared with a lead arsenate-treated plot. Notice the high mite population and the lengthy period of the infestation on the DDT plot, as compared with low infestation of shorter duration on the lead plot.

Some progress has been made in correcting this situation. At present this may be summarized as follows:

1. Apple trees to be sprayed with DDT should receive a dormant or delayed dormant oil spray. This will delay the build-up of a mite infestation.

2. When mites are first noticed on the trees in summer, DDT may be combined with summer dinitro, such as DN-111. Two or more applications may be used, or, of course, the dinitro may be applied alone. The combination of DDT with DN should not be used on Jonathan.

3. The use of DDT might be stopped in early July and anti-mite schedules used thereafter. Oil—nicotine can be used but there must be an interval of at least 5 weeks between oil and sulfur. Oil—rotenone can be used with the same qualification. DN-111, either alone or with lead arsenate, could be used.

To summarize the DDT situation in Ohio as regards its use on apple, it may be said that DDT is of great promise. However, it is so new that much experimental work with it must be done before it can receive a general recommendation.



DDT gave promise in control of the Tarnished Plant Bug in tests made in South Carolina orchards during the past two seasons. Peaches above exhibit plant bug injury.

## DDT Experiments on Peaches In South Carolina and Georgia By Oliver I. Snapp

United States Department of Agriculture  
Agricultural Research Administration  
Bureau of Entomology and Plant Quarantine

**D**DT has been tested in South Carolina for the control of sucking bugs that cause deformed peaches and in Georgia for the control of the plum curculio and the peachtree borer.

Deformed peaches caused by sucking bugs constitute a large percentage of the culled fruit in many peach orchards in South Carolina, especially in Spartanburg County. In 1942 as much as 20 percent of the fruit in some orchards was culled out because of its distorted and scarred condition. In 1944 the tarnished plant bug was found on peach trees in Spartanburg County in large numbers from the time they were in full bloom until petal fall. Observations in cages showed that newly set peaches were ruined within 7 days by the feeding of plant bugs.

DDT has been tested against plant bugs in South Carolina peach orchards during the last two seasons. In plots given a single application at full bloom in a large-scale orchard test in 1945, only 7.8 to 11.8 percent of the fruit showed plant bug injury at harvest, while in the untreated check plot 42.4 percent of the fruit showed such injury. Dusts containing 5 or 10 percent of DDT and used at the rate of about 1/5 pound per tree, and sprays containing 1 or 2 pounds of technical DDT per 100 gallons and used at the rate of about 1½ gallons per tree were about equally effective.

The results of laboratory and field experiments conducted during the last two years in Georgia indicate that

DDT offers little promise for the control of the plum curculio on peaches; it seems to be considerably less effective, as well as more expensive, than lead arsenate. However, DDT does not seem to injure the foliage, budwood, or fruit. DDT appears to have little effect on plum curculio larvae and pupae in the soil when applied as a spray to the ground after the larvae have entered.

Against the peachtree borer the results of tests made thus far have also been negative. A spray containing 1 pound of technical DDT per 100 gallons applied to the trunk and lower part of large limbs of peach trees at intervals during the entire incubation period of peachtree borer eggs in 1945 was not effective. Although as many as three applications of DDT were made to certain of the trees, the treatment appeared to have no practical value. In one experiment almost twice as many borers were found in the trees that received two applications of DDT as in the untreated trees.

## Observations on the Position of DDT in the Pacific Northwest

By Leroy Childs

Hood River Branch, Oregon Experiment  
Station

**T**HE sixty-four dollar questions asked of entomologists at the present time are, can I, should I, if I use DDT in my orchard for the control of various insect pests, what will happen? Now comes the AMERICAN FRUIT GROWER: "What are you and your associates in the Northwest, going to recommend?" The questions indeed put the entomologist on the spot. For those of us who have worked nearly a lifetime in the field, there exists the

(Continued on page 30)

# PHYGON

proves extra  
potent control for...



The remarkable effectiveness of the new fungicide, Phygon—a development of the United States Rubber Company—is being confirmed by representative experiment stations concerned with Apple, Cherry and Peach diseases. Phygon is so potent that one-half to one pound is used per hundred gallons of spray mixture.

Phygon becomes water-resistant after spraying—retains effectiveness through rainy weather—till later spraying is needed to protect new foliage or fruit growth. Phygon is ready to mix and use...needs no safener or other chemical.

Spraying with Phygon gives improved

control of: Apple Scab—Tomato Blight—Cherry Leaf Blight—Brown Rot of Stone Fruits—Bitter Rot of Apples—Downy Mildew of Beets. Investigation is revealing other specific uses. We invite everyone interested in control of these diseases to write for specific information.

## DDT SPRAY THAT KILLS APHIDS AND MITES TOO

Apple growers will be interested in our new DDT Agricultural Spray that controls codling moth and also European Red Mites and Aphids—pests immune to DDT alone. Send for information.

*Serving Through Science*

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FEBRUARY, 1946

# HISTORY OF HORTICULTURE

MARSHALL P. WILDER

GREAT AMERICAN HORTICULTURIST

By STANLEY JOHNSTON

President, American Pomological Society

AS the American Pomological Society approaches its 100th Anniversary the thoughts of many of its members turn to its early history. Standing out like a beacon light in the night is the name of Marshall P. Wilder, one of the founders of the Society and its first president. He was elected president in 1848 and, with the exception of a single term, held the office until his death in 1886, a period of 38 years.

Wilder was born at Rindge, New Hampshire, on September 22, 1798. He enjoyed farm life, but at 27 moved to Boston where he became a very successful merchant. He accumulated a fortune at an early age and then devoted much of his time to public service and his horticultural interests which were of first importance in his life.

In 1832 he purchased a suburban home at Dorchester in order to be in a location where he could grow fruits and flowers. His pear orchard at one time contained 2,500 trees, representing 800 varieties. During his life he tested 1,200 kinds of pears, and at one exhibition displayed a collection of 400 varieties. He produced several new pear varieties, and introduced many pear varieties from other countries, the best known being the Beurré D'Anjou. He carried a camel's hair brush in his pocket and was always hybridizing plants.

Wilder was as fond of flowers as fruits and at one time had a collection of 300 camellia varieties, undoubtedly the best collection in America. He produced many new kinds of camellias, and in 1834 introduced a double California poppy. Azaleas, orchids and roses were also of great interest to him. The Marshall P. Wilder rose made his name familiar to many rose lovers of a later generation.

Wilder's greatest contributions to horticulture were associated with the Massachusetts Horticultural Society and the American Pomological Society. Of the former he was a member for 56 years and President from 1841



MARSHALL P. WILDER

to 1848. Through his business skill and ability he worked out arrangements which assured the Massachusetts Horticultural Society of financial independence. His efforts for the American Pomological Society made it an organization of enormous value to the early history of American fruit growing.

Wilder was a born promoter and leader of men. In addition to his efforts for the Massachusetts Horticultural Society and the American Pomological Society, he was one of the founders of the Massachusetts Agricultural College and served on its board of trustees for many years. He also occupied a position of leadership in many other useful societies and institutions.

Mr. Wilder possessed an unusually fine and interesting personality. He was genial and charming, yet digni-

fied. He was very energetic, yet tactful enough to accomplish much without offending others. He met and recognized younger men of merit and encouraged them to greater efforts. For 60 years he devoted his money and talents to public service, consistently evidencing a whole-hearted enthusiasm and lack of self-interest which made him one of the best loved and most respected men of his time.

Some of Mr. Wilder's friends and admirers in the American Pomological Society established the Wilder Medal in 1871 which was to be awarded to outstanding fruit varieties and to horticulturists making unusual contributions to the profession. The last group of horticulturists to receive the Wilder Medal included Dr. N. E. Hansen, Brookings, South Dakota; Dr. U. P. Hedrick, Director, Geneva Experiment Station, Geneva, New York, and W. T. Macoun, Dominion Horticulturist, Ottawa, Canada. After a lapse of a few years this distinctive and prized award is to be revived by the American Pomological Society in 1946.

American horticulture is greatly indebted to the contributions of Marshall P. Wilder.

## AMERICAN POMOLOGICAL SOCIETY

Founded in 1848

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#### President

Stanley Johnston, South Haven, Michigan

#### Vice-Presidents in charge of:

National Apple Institute Program  
John Chandler, Sterling Junction, Massachusetts

#### Public Relationships

Reuben Benz, Yakima, Washington

#### Pomological Organization

B. S. Pickett, Ames, Iowa

#### Spray Residue Research

W. A. Ruth, Urbana, Illinois

#### New Fruit and Nut Variety Lists

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AMERICAN FRUIT GROWER



# Fruit crop enemy No. 1

...The Canker (or Measuring) Worm

The only nice thing about this greedy gangster is its scientific name—*Alsophila pometaria*. In the spring the females of this species (wingless and unable to fly) crawl out of the ground and up the trunks of fruit and other trees. Result: millions of eggs—millions of moths, millions of worms! Hungry worms. Crop-destroying worms! Profit eating worms!

Trees and vines banded with Tree Tanglefoot are protected against the ravages of canker worms and other crawling insects. Tree Tanglefoot is easy to apply. It goes on quickly, is long-lasting, costs surprisingly little! Tree Tanglefoot is economical, all-weather protection—protection of crops, protection of profits—against all climbing insects. Made by the manufacturers of Tanglefoot Gummed Kraft Sealing Tape—Difuso and the Difusolier—Tanglefoot Fly Paper.

# TREE TANGLEFOOT



**BAND  
EARLY—  
BAN  
WORMS!**

**THE TANGLEFOOT COMPANY**  
Grand Rapids 4, Michigan  
NEW YORK • CHICAGO • KANSAS CITY

FEBRUARY, 1946



**CONNECTICUT**—At the December meeting of the Connecticut Pomological Society, John Lyman, fruit grower of Middlefield, was presented with the Certificate of Award by Charles B. Young representing the Connecticut Pomological Society. This award was made in recognition of outstanding achievement and meritorious service in the field of Pomology. Mr. Lyman has given generously of his time and energies for the good of the fruit industry and is most deserving of this honor.

The two-day annual meetings of the Connecticut Pomological Society were well attended and in spite of the light apple crop there was a very creditable fruit display. It was evident that growers were concerned about the possibility of a large apple crop in 1946 and the marketing of this crop.

Such speakers as E. W. J. Hearty of New York, John Chandler of Massachusetts, John Lyman of Connecticut, B. W. Drew of Massachusetts, Bernard Rickenback of New York and Orrin Kilbourn of Connecticut, gave encouragement on possible outlets and the future of the fruit industry in the Northeast. Dr. W. P. Judkins of the Ohio Agricultural Experiment Station gave an excellent illustrated talk on fruit experiments now being carried on at the Wooster Station.—*H. A. Rollins, Head of Plant Industries, University of Connecticut, Storrs, Connecticut.*

**KENTUCKY**—The cheapest, best and most convenient source of mulch material for the apple and peach trees can be produced each year in the orchard—at least this is the commercial practice in Kentucky orchards. Most of our Kentucky orchard land responds favorably to an application of 1½ to 3 tons of Agricultural Lime Stone broadcast per acre, together with an additional application of 300 to 1,000 pounds, per acre, of 20% superphosphate. Such a treatment will cost from \$10.00 to \$25.00 per acre and will be effective for several years. Most of our orchards are using Lespedeza as a cover crop. Five extra inches of Lespedeza growth is equivalent to a ton of mulch per acre and thus gives us a legume material for the mulch, probably worth over \$15.00 per ton to the orchard. The Lespedeza is usually mowed just in advance of harvest and can be left where it falls, or raked and spread under the tree branches in early fall, thus preventing a fire hazard.

In addition to the above treatment, we have found we can broadcast from 100 to 200 pounds per acre of the ammonium nitrate (at an additional cost of about \$6.00 per acre and produce another extra ton of mulch) making this application on a dry day in May or June, with a Cyclone Seed Sower.

Most of our fruit growers have a few extra dollars now to "spend" or "invest" and think they can come nearer getting 100% interest each year on their investment by spending some of this money in carrying out the above mentioned practices.—*W. W. Magill, Secretary, Kentucky State Horticultural Society, Lexington, Kentucky.*

**MARYLAND**—Following the pattern of other State horticultural meetings, the Maryland meeting drew a record attendance. This is a hopeful sign that fruit growers

are going to do those things that they planned to do in the postwar period, and that period is here.

One speaker told Maryland growers to be ready for continued price ceilings on the 1946 and possibly the 1947 fruit crops. With a tremendous crop, but no competition, the citrus ceiling prices were re-established to control prices.

Fruit growers again have been warned that the honeymoon is over, and that in spite of price ceilings that loosened up on grade and quality, the growers must voluntarily improve grade and quality if the apple demand is to be maintained. We have lost years of training in grading and packing during the price ceiling period.

Maryland growers in one section produced well over 10 tons of tomatoes per acre on several hundred acres of tomatoes planted as a catch crop in young apple orchards, in 1945, following losses by freezing out of the apple crop.

Orchard labor is a source of worry in Maryland as elsewhere and growers working with Extension Service officials are now preparing to salvage any labor sources. It is predicted that the 1946 labor problem will be the worst experienced so far.—*A. F. Vierheller, Extension Horticulturist, University of Maryland, College Park, Maryland.*

**MICHIGAN**—The Michigan State Horticultural Society will hold four spring meetings in late February or early March in Pontiac, South Haven, Hart and Traverse City. Programs in regard to insect and disease control will be presented at all of these meetings. Michigan fruit growers are particularly interested in the use of DDT in orchards. During the war period, our summer orchard tours were omitted due to tire and gas rationing. A regular one day orchard tour will be held this year in

August visiting orchards in Kent and Newaygo Counties.—*H. D. Hootman, Secretary, Michigan State Horticultural Society, East Lansing, Michigan.*

**NEW YORK**—As a part of its membership drive the New York State Horticultural Society has made an analysis of the location of its 1945 membership. The members were divided according to county and post office. Then a membership list was prepared for each county; the names of members were listed alphabetically under their postoffice address. With their January News Letter each member received the membership list for his county. By looking at his post office address, he could see which of his neighbors were members. His neighbors not on the list were the ones for him to see and to encourage to join.

The number of members in each county was compared with the number on the spray service list of the Extension Service. For the larger fruit counties, from 4 to 13 per cent of those on the spray list were members of the Horticultural Society. This information was shown by counties in the January News Letter, and clearly indicated the need for membership work in each county.

The 91st annual meeting of the New York State Horticultural Society was held in Rochester January 16, 17 and 18. Among the out-of-state speakers were Dr. J. H. Gourley from Ohio, who discussed "The fruit outlook in the Eastern United States", E. A. Meyer, chief of the fruit and vegetable division, U.S.D.A., who spoke on "The Outlook for Processed Fruits", and John Scoville, formerly chief statistician of Chrysler Corporation, who discussed "Full Employment".—*Tom LaMont, Associate Secretary, New York State Horticultural Society, Albion, N.Y.*

(Continued on page 45)

## LESSONS IN ORCHARD CHEMISTRY

By E. D. WITMAN, Research Associate  
Ohio State University Research Foundation

### DDT

DDT is made today as it was 72 years ago. From coal the chemist obtains benzene from which he makes chlorobenzene by treating with chlorine gas. From grain alcohol he prepares chloral also by treating with chlorine gas. He then mixes the chlorobenzene and chloral in the presence of sulfuric acid to make DDT.

As produced in the above process, DDT is not suited for direct use as an insecticide because of its physical nature. The manufacturer must "formulate" the DDT into a solution, emulsion, powder, or aerosol.

Pure 1-trichloro-2, 2-bis (para-chlorophenyl) ethane (called the "para, para prime isomer") is a white solid which melts to a liquid at about 109° Centigrade. The commercial product contains approximately 70 percent of this para isomer and melts at about 90° Centigrade. It is only very slightly soluble in water; but it is reasonably soluble in oils. It is quite stable under ordinary conditions and has a wide range of compatibility with most commonly used insecticides and fungicides.

Although not a cure-all, it is certainly a valuable addition to our family of pest-control chemicals. The advantages and disadvantages of DDT have been studied in great detail, and much information has been collected. In some instances definite recommendations for use have been made—notably on potatoes, where it seems to be extremely effective for insect control.

A new insecticide known as gamma hexachlorocyclohexane, or "666" has been recently discovered in England. It is also called benzene hexachloride and Gammexane.

It is produced by passing chlorine gas (from salt) into benzene (from coal). In such a process at least four "isomers" are formed; but only one of these, the gamma, is insecticidal.

Its use in field experiments in this country has been limited and little is known of its efficiency. It appears that "666" may complement DDT rather than displace it.

## IN THE NEWS

### WILLIAM A. BENITT

William A. Benitt of Hastings, Minnesota, was recently elected President of the Minnesota Fruit Growers Association. One of the state's strongest advocates for soil conservation and President of the Minnesota Soil Conservation Association, Mr. Benitt has shown by his past achievements that he highly deserves his newly-elected position.



WILLIAM A. BENITT

Last summer Mr. Benitt received the W. G. Skelly achievement award for the record he made on his 200-acre farm. He and his wife and partner, Linda J. Benitt, produced 16,980 pounds of pork, 22,290 pounds of beef, 13,858 dozen eggs, 6,500 bushels of apples, 1,500 bushels of corn, 1,300 bushels of oats, 100 bushels of potatoes and 100 tons of hay. This is really a record of which to be proud.

### LOWRY WALKER

Lowry Walker of Springdale, Arkansas, is essentially a Northwest Arkansas product, according to Thomas Rothrock, Secretary of the Arkansas State Horticultural Society.



LOWRY WALKER

Mr. Walker was born in Rogers, Arkansas on "ground hog day" some thirty years ago. After grade school days, he attended Kemper Military Academy and then the University of Arkansas.

Having worked on the family fruit farms during school vacations, Lowry Walker returned to

them after completing his education. He is now the sole manager of the Walker Orchards. These orchards include 120 acres of bearing and 50 acres of non-bearing apple trees; 50 acres of bearing peaches; 38 acres of cherry trees interplanted with the young apple trees; and 7 acres of grapes.

Lowry expects to spend many more years growing Ozark fruits and his youth and stamina should enable him to do so.

### JOSEPH C. McDANIEL

The new Head of the Division of Tennessee Horticulture is Joseph C. McDaniel of Ashland City, Tennessee, as recently announced by State Commissioner of Agriculture, O. E. Van Cleave.



JOSEPH C. McDANIEL

Mr. McDaniel brings to his new work a wide acquaintance with orchards both in the North and South. At one time, he administered a farm of some 2,300 acres in Alabama. While there, he enrolled in the Alabama Polytechnic Institute where he majored in Horticulture.

(Continued on page 36)

*You're* **MONEY, TIME and ENERGY AHEAD** *on every job*



with a **JOHN DEERE** Model "L" or "LA" General-Purpose Tractor

Consider your spring and summer work that lies ahead. Plowing, disking, harrowing, planting, transplanting, cultivating—all are tedious, costly jobs if you use a team—but what a difference when you have an eager, work-consuming John Deere Tractor with matched equipment!

Whatever the size of your cultivated acreage, you can put one of these thrifty, quality-built tractors to steady, profitable use. See your John Deere dealer now . . . he will do all he can to help you put your farm on the same new earning basis so many "L" and "LA" owners are enjoying.

Write today to John Deere, Moline, Illinois for free illustrated folder showing both tractors and full line of matched working equipment.



Integral Spring-Tooth Harrow in Berries

## EXPERIMENT STATION RESEARCH WITH DDT

(Continued from page 24)

realization of the tremendous and almost undreamed of, possibilities of this new insect killer. Most of us are unable to be very specific at present, due to the limited period during which time DDT has been available for experimentation. The writer's thirty years' experience with the codling moth and its control, the Pacific Northwest's most expensive horticultural pest, has not been an altogether happy or gratifying one. To be sure we have been able to live with this problem, and ways and means have been devised which have enabled growers to produce apple and pear crops relatively free from excessive worm damage.

### Increase in Production Cost

During this 30-year period, there has occurred an ever mounting cost. It has been necessary to increase the number of applications from 3 to 4 per season in the early days, to 6 to 10. Greater gallonage per tree and more expensive combinations of sprays have been required. Associated with these changes has occurred vastly

improved mechanical devices for the application of spray materials. These improvements have further added to the cost of production but in the main offered little or no promise of permanent relief in the form of a less intensive time-consuming and costly annual battle with the codling moth. This program is a three to four million dollar cash expense account each year for Oregon and Washington growers alone. This estimate does not include loss in value of fruit due to codling moth damage that occurs in varying degree regardless of the spray program.

The outlook for basic relief in the management of numerous major insect problems of economic importance before the advent of DDT and some of its interesting relatives, were likewise in a category similar to that of the codling moth. The appearance of these new insecticides has vitalized the older entomologists and opens up vistas of unbounded extent to the younger scientists. It will be necessary to reinvestigate the entire field of insect control. Before DDT can be

used without qualification, we must know more about the relationships of the material on the sprayed plants; relations and effects where DDT is used in combination with fungicides employed with, before, or after for the control of numerous fungus diseases and effects on the orchard soil beneath sprayed trees. There will occur an extensive build-up of the chemical from continued usage. What will happen to the beneficial animal, bacterial and fungous life, the presence of many of which are essential to a productive soil? What will happen to the many beneficial insects in the orchard which normally keep under control, other insects possessing damaging potentialities? What will happen in streams and lakes where drainage into same can occur from extensively sprayed areas. These are a few of the related problems that the entomologist has in his mind when asked for a recommendation concerning DDT usage. None of these inquiries can be adequately answered at the present time.

### DDT Only Partially Tested

At the recently held Dallas, Texas, meeting of the American Association of Economic Entomologists, 30 or more entomologists from various parts of the nation working on the codling moth problem, gathered in an informal meeting. All agreed that DDT was by far the most effective spray thus far devised for the control of this insect. When the question was individually asked "Are you going to recommend DDT for codling moth control in 1946? The answer was "no" but usually qualified as follows: "Our organization is making suggestions based upon our limited investigations as many growers in our state are going to use DDT in their program next year." This attitude appears to be more general among Mid-Western and Eastern investigators than those from the far West where usage seems to be more complicated. Limited or closely supervised usage appears desirable. Commercial treatment employed within reason, will bring out complicating problems associated with DDT usage at a much earlier date than would be the case where knowledge was gained from limited experimentation only. Growers should realize, however, they are dealing with a material only partially tested and be on the alert for developments that might result in extensive losses.

In the Pacific Northwest, the two-spotted mite, a relative of the red spiders, offers the greatest deterrent insofar as grower usage of DDT on fruit trees is concerned. This pest often builds up a tremendous population where trees in foliage are

(Continued on page 40)

### IN THE SOUTH PACIFIC



**THE MEDICINE MAN SAYS IT'S A NEW CHARM CALLED THE B. F. GOODRICH TIRE... CLAIMS IT MEANS LONG LIFE**

Sure, wherever you go, the name B. F. Goodrich on a tire means extra long life. That goes for tractor tires, truck tires, and tires for your car. Right now you want to get ready for spring work,

make sure your tractor and implements are in shape. Tires are still scarce. See the B. F. Goodrich dealer now. Ask him to put your name on his preferred list.

AN ADVERTISEMENT OF **B. F. Goodrich** ★ **FIRST IN RUBBER**

# NUT GROWER NEWS

## THE CHINESE CHESTNUT

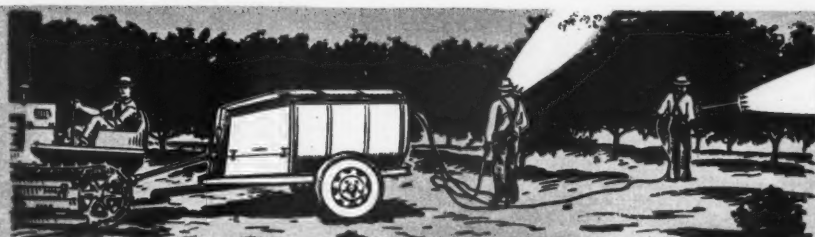
THE Chinese chestnut is attracting much attention now and nurseries are having difficulty in securing enough plants to supply the demand. For the most part seedling trees are being planted as the supply of grafted trees is very limited. In the present state of development of the Chinese chestnut information concerning the performance and adaptability of the named varieties is very meager. For this reason perhaps, the planting of seedling chestnuts should be encouraged to stimulate and maintain interest in this fine nut until thoroughly tested named varieties are available in quantity. Moreover, among all the seedlings now being planted there will surely be some of sufficient merit to be worthy of propagation.

Among those who have brought Chinese chestnut seedlings to bearing age is E. Sam Hemming of Easton, Md., who reported their performance in the Northern Nut Growers' Association report for 1944. Mr. Hemming received 25 trees from the United States Department of Agriculture in 1930 but six died from drought. The remaining 19 started bearing about 1934 or 1935 and from 1937 yield records have been kept except in 1938 and 1940 when the crops were light. The average yield per tree in 1937 was 6.25 pounds, in 1939 24.36 pounds, in 1941 29.71 pounds, in 1942 34.64 pounds and in 1943 39.44 pounds. The total yield per tree varied from 67 to 215 pounds.

Mr. Hemming points out that for seedling trees they bear uniformly well. An average of 40 pounds per tree with 50 trees to the acre planted 30 feet by 30 feet would mean a yield of 2000 pounds to the acre. The number of nuts to the pound varied from 36 to 63 with many running around 40 to 50.

An orchard of 880 trees propagated from the original trees bore over one pound per tree four years after setting out the 2 year old trees. The size of the nuts of the parent tree is well maintained in the new orchard.

Japanese chestnuts were tried but the quality of the nuts was inferior and the trees were soon removed.—GEORGE L. SLATE, Northern Nut Growers' Assoc., Geneva, N.Y.

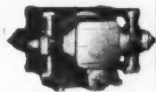


8 years from now  
maybe **YOU** will  
write a letter  
like  
this



"I have used my 'Friend' Sprayer 8 years, at 500 to 600 lb. pressure. **The lack of breakdowns or repairs has been phenomenal.** It is one of the most satisfactory and reliable pieces of machinery it has ever been my privilege to operate."—(Name on request).

**You hear this from THOUSANDS of growers—and here's why:**



**The "Friend" Pump is the simplest** built for high pressure spraying—having only 1/2 to 1/3 as many moving parts.

**Complete Lubrication** of moving parts, including the plungers. Many growers have used "Friend" Sprayers for years without changing either plungers or packing.

**You Never Spray with a Leaky Pump.** A very slight turn on the adjustment screw stops a leak—not necessary to take the pump apart and repack it.

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**Roller Bearings,** exclusively; mostly oversize Timkens. Not one plain bearing on a "Friend" Pump.

For real spraying satisfaction, buy a "Friend."

Built in all good chassis styles, in a complete range of sizes. Pressures up to 1,000 lbs.

**FRIEND MANUFACTURING CO., Gasport, N. Y.**



Dusters with the same Reliability as "Friend" Sprayers.

Sizers and Cleaners for every requirement.



**Easiest to Maintain in Working Order--**

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# Now's the Time

TO GET EFFICIENT, WORK-  
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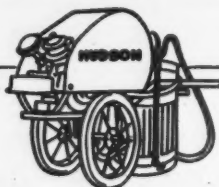
## HUDSON SPRAYERS

With by far the bigger share of this season's spraying still ahead, now is the time to double-check *all* your spraying equipment. Replace aging or inefficient units with HUDSON Sprayers. These correctly designed, powerful and ruggedly built sprayers will save you time, work and money this year and for many years to come. Have the "perfection of application" assured by HUDSON Sprayers.

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**PRODUCTION COUNTS...** and you can count on production from 'Aero' Cyanamid—agriculture's most useful form of nitrogen. Make this modern material your partner in production and get better profit from your long hours and hard work.

'Aero' Cyanamid guarantees 20.6% nitrogen — that's what

you pay for. It contains 70% lime—and the lime costs you nothing. 'Aero' Cyanamid not only feeds your crops; it helps sweeten your soil and keep it sweet. Write for valuable free folder "Profits Grow From Humus." American Cyanamid Co., Fertilizer Division, 30 Rockefeller Plaza, New York 20, N. Y.

# 'AERO' Cyanamid

AGRICULTURE'S MOST USEFUL FORM OF NITROGEN

## DDT FOR FRUIT-INSECT CONTROL

(Continued from page 13)

such measures have been suggested. Where the European red mite predominates, applications of oil against the winter eggs during the dormant season will reduce the danger of excessive mite abundance, but not always enough to keep the mites from increasing to large numbers late in the season. The use of summer oil with DDT in certain applications helps to keep down mites of all species, but in second- or third-brood applications is undesirable from the standpoint of spray residues. Under some conditions the mixture of oil and DDT may also cause foliage injury. The use of certain of the dinitro compounds with DDT has been suggested for mite control, and certain of these materials are very effective for this purpose. As a group, however, these compounds are often injurious to foliage. Further work is therefore needed to determine which compounds can be used, and the conditions under which the danger of injury will be the least. Although entirely acceptable measures for mite control in a DDT program have not been worked out, some growers are having such a tough battle with the codling moth that they will take a chance on mite infestation as the lesser evil.

The residue problem should also be kept in mind in the planning of any DDT program, and the schedule adopted should be one that experience in the area has shown will not leave residues in excess of the present administrative tolerance. As already indicated, effective methods of removing DDT residues have not yet been developed.

Any program adopted should take care of any important insects that are not affected by DDT. For instance, if the plum curculio is prevalent in an orchard, lead arsenate should be retained in the early applications, since DDT is ineffective in curculio control. Other pests, rated as of minor importance, are likely to become abundant again if DDT comes into general use. Some of these will increase in numbers because of the elimination of their natural enemies, as already mentioned. Others, not susceptible to DDT, have been automatically controlled by the standard materials used against the codling moth or other major pests, and may break loose with a change in spray materials. Such problems will have to be dealt with as they appear.

It is not the purpose of this article  
(Continued on page 34)

AMERICAN FRUIT GROWER

## CALENDAR OF COMING MEETING AND EXHIBITS

Feb. 4-5—Nebraska State Horticultural Society Annual Meeting.—E. H. Hopert, Sec'y, Lincoln.

Feb. 6-7—The Annual Meeting of the Ohio State Horticultural Society will be held at the Netherland Plaza Hotel, Cincinnati.—Frank H. Beach, Sec'y, Columbus.

Feb. 7-8—Annual Meeting of the Idaho State Horticultural Association at the Hotel Boise in Boise.—A. Harold Davidson, Sec'y, Nampa.

Feb. 7-8—Seventy-Ninth Annual Meeting of the Kansas State Horticultural Society at Kansas State College, Manhattan.—Geo. W. Kinkead, Sec'y, Topeka.

Feb. 8-9—The 51st Annual Convention of the West Virginia State Horticultural Society at Martinsburg.—Carroll R. Miller, Sec'y, Martinsburg.

Feb. 20—The Rhode Island Fruit Growers Association will hold its annual meeting in connection with the Farm and Home Show being sponsored by the Rhode Island Agricultural Conference.—E. P. Christopher, Sec'y, Kingston.

## DDT FROM WAR TO PEACE

(Continued from page 11)

of it was being used in the South Pacific. At Peleliu soldiers with chemicals and spray guns landed on the beaches with those who had grenades and rifles and both worked their way inland together. As a result, for the first time in tropical island fighting, casualties from mosquitoes and flies were negligible.

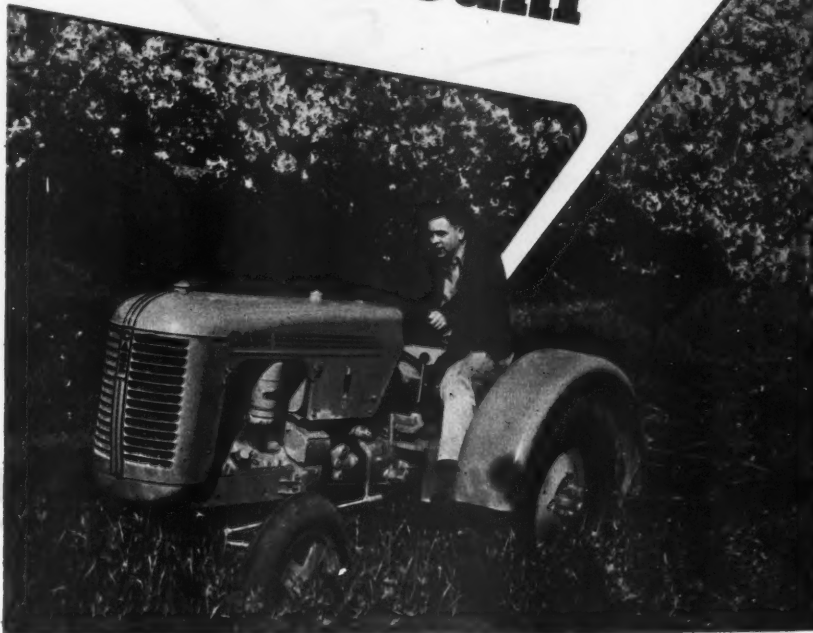
On Saipan tons of DDT were sprayed from C-47 transport planes and soon the number of insects on this island were no greater than on an equal area in the United States and dengue fever and dysentery and malaria were wiped out.

Such is the history of DDT and its part in winning the war. Now with the world again at peace, the service of this useful insecticide is transferred to agriculture to help growers battle an increasing horde of destructive insects and save food crops badly needed to insure the peace.

The fight of man against insects has been constant. There have been years when agricultural pests have multiplied to such an extent that specific crops have been destroyed over large areas. Some pessimistic entomologists have wondered if in some distant future, insects might not drive man from the earth.

Now with the advent of DDT, it begins to look as if man might win his war against insects.

## Look for the Things That Count



## With Experienced Operators

Most of the Case tractors built are bought by men who have worked with tractors for years. Experience has taught them the things that really count—both those that show and those that don't. Chief among things that don't show is Case ENDURANCE—the quality that enables them to run extra years with low upkeep.

Experienced operators like the Case full-swinging drawbar that makes short turns easy with full load, locks automatically to prevent buckling when backing . . . safety seat that pushes up for a backstop when the driver stands for a change . . . wide range of gear and engine speeds, from creep travel in non-stop spraying to safe highway transport.



# CASE

All-Purpose Models, Too, are built in the same three sizes as Case orchard tractors. The smallest, the "VAC," is shown with extensible front axle, favored for truck farms and combinations with fruit. See your Case dealer; write for catalog on size and type of tractor to fit your work. J. I. Case Co., Dept. B-13, Racine, Wis.

# Here's why most Airlines specify Champion Spark Plugs



## THEY'RE DEPENDABLE!

Your choice of Champion Spark Plugs for every item of power farming equipment is made easy and sure if you follow the judgment and experience of men who know spark plugs best—men, like yourself, to whom spark plugs are a vital factor in their business. Most airlines find in Champions those indispensable qualities so essential to the better performance of your car, truck, tractor or stationary engine. Champion Spark Plug Company, Toledo 1, Ohio.



# CHAMPION SPARK PLUGS

FOLLOW THE EXPERTS . . . SPECIFY DEPENDABLE  
CHAMPIONS FOR YOUR CAR

## NATIONWIDE FRUITS

(Continued from page 21)

ments begun by the Station in 1902 and carried on since then with variations have been so promising, however, that a new series of tests have now been started involving the use of 15 to 20 rootstocks on Concord and Niagara grapes. The grafting operation is not difficult, says Dr. Oberle, and it is believed that if there is sufficient demand grafted stocks will be obtainable in sufficient quantities.

"European grape growers have been growing their grapes grafted on resistant American rootstocks for almost 75 years in order to combat the grape root louse and have observed that many grafted vines grow far more vigorously than on their own roots," says Dr. Oberle. "The increased vigor is generally associated with heavier yields and superior quality of the fruit. It is thought that these responses are due to better adaptation of the rootstocks to soil conditions, with more extensive root systems than are common to own-rooted vines."

Grafted vines require more care in pruning and cultivating, it is explained, as there is more danger of injuring a grafted vine than one that is growing on its own roots. Also, if a grafted vine is injured or frozen back it cannot be renewed by suckers from the roots, as in the case of own-rooted vines. The productive life of vineyards of grafted American grapes is not yet definitely known, but one of the experimental vineyards maintained by the Station had continued in good condition for thirty years when it was abandoned to make way for another experiment.

## DDT FOR FRUIT-INSECT CONTROL

(Continued from page 32)

to suggest or outline detailed programs for the use of DDT. Information of this type can be better furnished by State or local agencies that are familiar with local conditions and with the work that has been done in the particular area.

DDT is a powerful insecticide, and is certain to assume an important place in the orchard-insect control program. Unless an emergency situation must be met, however, growers will do well to make haste slowly, and restrict the use of the material to a limited acreage until there has been more experience with it and solutions have been worked out for the numerous problems connected with its use.

AMERICAN FRUIT GROWER

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## SUGGESTED DDT SPRAY PROGRAM

(Continued from page 17)

sprays in various applications beginning with the third cover spray, excepting that DN-Dry Mix was not used before the fifth cover spray. Three quarts of 83% summer oil emulsion added to each DDT spray from the third to the seventh cover inclusive was less effective than any of the other treatments mentioned, resulting in 64% reduction of the mite population as compared to 76% to 98% reduction from the other treatments listed. Previous experience has indicated that 6 quarts of summer oil emulsion per 100 gallons is usually required for effective control of mites.

Some orchardists who used DDT in the powder preparations found it difficult to remove the visible residue at harvest time. This was true in a number of instances when the last spray was applied around the middle of August. Our own experience indicated that the visible residue was more readily removed by the polishing machines when Bordeaux mixture was used with DDT in the last or next to the last spray. Visible residue was more conspicuous from 25% DDT powder than from 40% or 50% preparations, indicating that the conspicuous residue is largely due to the inactive ingredient.

Chemical analyses of DDT residue on apples were made by the Division of Chemistry of the Virginia Department of Agriculture and also by the Geigy Company. A brief resume of their results indicate the following:

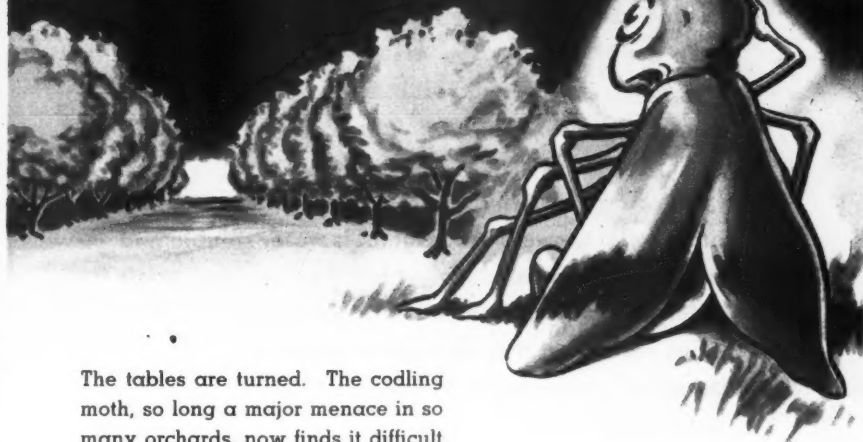
(1) Applications of  $\frac{1}{2}$  pound DDT per 100 gallons in five cover sprays ending August 7 or in six cover sprays ending August 17 resulted in residues of .05 grain DDT per pound of fruit or less than this amount at harvest time.

(2) Residues resulting from sprays of 1 pound of DDT per 100 gallons in six to eight applications, ending August 7 or August 17-18, usually exceeded .05 gr./lb. (range .044 to .088 gr./lb.).

(3) The addition of 3 quarts of summer oil emulsion in the third to seventh cover sprays or 6 quarts of oil in the last four cover sprays containing DDT greatly increased the DDT residue found at harvest time.

(4) DDT residues were not readily removed by the usual methods of washing or polishing the fruit.

## TWIXT BLOSSOMTIME AND HARVESTIME ACTIVITY'S CONFINED BY ORTHOL-D OR ORTHOL-K WITH NICOTINE COMBINED



The tables are turned. The codling moth, so long a major menace in so many orchards, now finds it difficult to survive where ORTHOL-D and ORTHOL-K Phytonomic Summer Oil Sprays are used.

These summer oils are very effective ovicides. Combined with Black-Leaf 40 and Black-Leaf 155, they serve to retain the poison, as well as to kill both larva and moth by contact.

Decided reduction in damage caused by codling moth, leaf hopper, red mites and pear psylla follow the use of these ORTHO sprays. Ask your ORTHO fieldmen for complete details.

ORTHOL-D is particularly successful against mites. With or following DDT formulations in earlier sprays, ORTHOL-D assists materially in checking red mite build-up.



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SPRAY PROGRAMS

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SPRAY-CHEMICAL CORPORATION  
RICHMOND, CAL. ELIZABETH, N.J.

# Reasons Why you should use **ELGETOL**

This year, as in the past—it's **Elgetol**—with successful growers everywhere. The reason: More and more of this watersoluble dinitro dormant spray is being used because it has proven its worth under every condition. Season after season its ovicidal, insecticidal, and fungicidal action has controlled aphids, bud moth, twig borer, crown gall, oyster shell scale, and other pests.

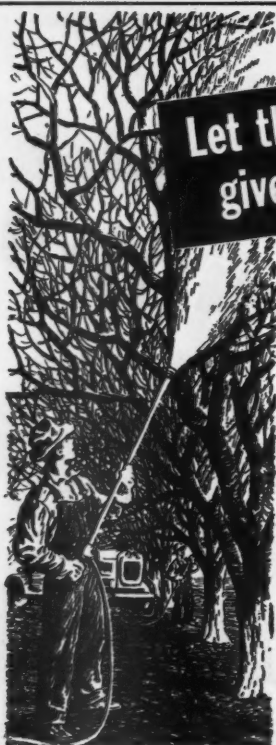
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Let the *complete* dormant spray  
give your trees a healthy start

**SCALECIDE**—the *complete* dormant spray —is the safest and most effective means of getting rid of overwintering insects, invigorating your trees, and giving them a good healthy start for Spring growth.

Scalecide kills scale, red mite, aphids (delayed dormant), bud moth, case bearer—pear psylla, overwintering codling moth and many other pests. Scalecide also has an invigorating effect on tree growth that is unequalled by any other spray. Apply just before the foliage starts in the Spring. Simple, safe, easy to use. One gallon makes 16 gallons of spray.

Give your fruit trees, shade trees, shrubs and vines the protection that Scalecide alone can give. For sale by dealers everywhere.

**SCALECIDE**

For 40 Years  
America's No. 1  
Dormant Spray

B. G. Pratt Co., 163 River St., Hackensack, N. J.

Mfr's of Scalecide, Para-Scalecide, 25% DDT (Liquid), 50% DDT (dry-wettable), D-X Spray, Surfispray

## SUGGESTED DDT SPRAY PROGRAM

(Continued from page 35)

The spray schedule suggested on page 17 is believed to be first choice among a number of possible programs for using DDT on apples in heavily infested orchards. Spray materials in the calyx and preblossom sprays should not differ from the materials used in the regular lead-arsenate program.

DDT spray deposits lose toxicity to codling moth adults and larvae, and omission of sprays can be expected to result in failure of control. Furthermore, thoroughness of spraying is essential for control.

Growers who make a sixth application of DDT in August may encounter difficulty with the spray residue problem. If additional sprays are needed it may be advisable to use oil and nicotine, or else lead arsenate at the usual strength and wash the fruit at harvest time for removal of the lead-arsenate residue.

One pound of DDT is suggested in the first application because at this strength it is an effective moth-killing agent and usually a large number of moths are in the orchard by the time this spray should begin.

When Bordeaux mixture is used add the DDT last and after the tank is full of water.

If mites are threatening after the last cover spray, use either (DN-111) 1 1/4 pounds or Genicide 1 pound per 100 gallons in one or two applications.

It has been reported that Jonathan trees may drop their fruit and foliage if sprayed with DN-111 under certain conditions. As a precautionary measure this variety should not be sprayed with DN-111.

Oil is not recommended for use with DDT because of its tendency to build up residues beyond the limits of the informal tolerance for DDT.

## IN THE NEWS

(Continued from page 29)

In addition to winning his degree at Alabama "Poly," Mr. McDaniel has completed postgraduate work in Horticulture at the University of Tennessee, Ohio State University and Michigan State College, with extra work part of the time in Forestry.

From 1935 to 1940, Mr. McDaniel worked with the T.V.A. doing experimental work with nut trees and native fruits, in addition to other duties. From the T.V.A., he went to Florida where he spent two years with the U.S. Department of Agriculture.

A little over a year ago Mr. McDaniel returned to Tennessee, his favorite state. In Cheatham County, he took up Soil Conservation work, which he now leaves to serve the fruit growers of Tennessee.

AMERICAN FRUIT GROWER

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ROWER

## MACHINERY FOR SCAB CONTROL

(Continued from page 19)

on either side.

The location of the Sullivan boom is rather low, however, for efficient coverage of tall trees. Most of the larger growers of the area have similar booms swivel-mounted on the top of the spray tank or tower and feel that the addition of a truck or tractor-driver to the spray crew is profitable. The Burrell orchard's boom is pictured on page 18. It consists of a standard 8-nozzle spray boom extended with common galvanized pipe fittings and ordinary nozzles, to a spread of 6 feet. A pump rated at at least 35 gallons per minute is desirable, although with No. 3 discs (3/64 inch hole) the gun can be operated with a slightly smaller pump. The pressure should be 450 pounds or preferably more. The spray will carry farther and penetrate better if discs with larger holes are used. It is better to reduce the number of nozzles than to sacrifice pressure. A truck is more economical than a tractor, where topography and soil conditions permit, especially if the spray rig is driven to the source of water after each load. F. H. Lewis, now at State College, Pennsylvania, had an active part in the local development of this boom; similar devices have been used elsewhere.

Most growers who now use these 16-nozzle booms formerly employed a driver plus 2 sprayers, one spraying to the right, and the other to the left, with 8 nozzle booms. The men, alternately sprayed against the wind, got soaked and disgusted and did an inferior job. The saving of one spray man, with no reduction in number of nozzles is an obvious economy. The usual experience is better control of scab, when one sprays just one direction at a time; such spraying usually is with the wind. A 60-90% coverage of the tree is thus effected, and when the other side is sprayed, a similar coverage is secured. If this is a day or more later, some previously unexposed green tissue can be covered. Many growers have found this plan of spraying efficient in scab control although on hilly or muddy ground the extra driving may be objectionable or even impractical. On very large trees or in later sprays, it might be necessary to supplement this mounted boom with a gun operated from a tower or from the ground or a low platform.

Tall, vertical booms with ordinary nozzles discharging horizontally were used around Kinderhook, N.Y., as much as 20 years ago, and did

(Continued on page 38)

## WHY "CATERPILLAR" DIESELS POWER THE WORLD'S LARGEST D'ANJOU PEAR ORCHARD!



Supt. Van Amburg, of Mt. Adams Orchards Co., inspects large skid-mounted fan, powered by Diesel D2 from rear power take-off—to draw cold air off trees.

Piling brush with ranch-made bulldozer mounted on a "Caterpillar" Diesel D2 Tractor. Mt. Adams Orchards Co. owns three Diesel D2s, one Diesel D4.



Mt. Adams Orchards Co., White Salmon, Washington, operates the world's largest Buerre d'Anjou pear orchard—250 acres; plus 150 acres of other fruit. Four "Caterpillar" Diesel Tractors handle all their power jobs. States Wallace Van Amburg, Supt.: "Our 'Caterpillar' Diesels enter into virtually every operation of our fruit production; even in pruning, for brush removal. We depend heavily upon these tractors to pull the power take-off sprayers—2 of 800- and 2 of 1000-gallon capacity. In a normal day, we

put out around 40,000 gallons of spray.

"In harvesting, the d'Anjou crop must be picked and packed in a 3 weeks' period. Our tractors haul in the 7000 to 10,000 boxes each day. In winter we use them to keep roads open.

"Their fuel cost is less than 1/3 as much as for gas tractors. Our biggest satisfaction from owning 'Caterpillar' Diesels is their dependability with changing operators—and their ability to keep going without being laid up for repairs."

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

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EARTHMOVING EQUIPMENT



The discharged veteran wears this emblem. Remember his service and honor him.

— Facts from the Source —

PAGE 2

## Effectiveness of DDT Clearly Established for Control of Codling Moth on Apples, Pears and Walnuts

Large-scale tests under commercial orchard conditions show DDT compositions far superior to previously used materials for codling moth control on apples, pears and walnuts.

In GESAROL\* AK 50, Geigy offers you a tried-and-proven composition developed specifically for orchard sprays through seven years of production experience.

GESAROL AK 50 is a 50% DDT wettable powder. It is easily dispersed in the spray solution yet foaming does not occur. Maximum deposit on foliage and fruit is assured since there is no surface-active wetting agent or spreader to cause excessive run-off. It is formulated to be compatible with commonly used spray materials.

You can use GESAROL AK 50 with complete confidence in results. It has been used extensively in field tests by many investigators and demonstrates exceptional performance.\*\*

\*Reg. U.S. Pat. Off.

\*\*We suggest that you consult your state experiment station or local agricultural authority for recommendations on applying DDT insecticides since no one codling moth spray program is applicable to all conditions or areas.



ORIGINATORS OF  
DDT INSECTICIDES

# GEIGY COMPANY, INC.

89-91 BARCLAY ST., NEW YORK 8, N. Y.

## MACHINERY FOR SCAB CONTROL

Continued from page 37)

well in early-season scab control. Some were designed so they could be pointed forward or backward toward the tree being sprayed and one was in constant mechanical movement, up and down. They proved less satisfactory for codling moth control when that pest got bad. Some recent vertical booms elsewhere, employed several 4 to 8 nozzle heads which were tilted simultaneously up and down with manual control. Since they did not penetrate the tree sufficiently for codling moth, they were superseded by vertical booms with several adjustable guns similar to the usual single nozzle spray gun, but mounted at different elevations. In some California rigs, these guns are kept in continual motion by hydraulic power. These vertical booms, which are an accessory for spray machines with a capacity of 35 gallons per minute for small trees or 50-60 g.p.m. for large ones, cover trees at a rate similar to that of a Speed Sprayer. They are not, at present, in large-scale commercial production, but appear very promising.

### Newer Kinds of Sprayers

A few comments on some of the newer spray machines from the standpoint of scab-control may be pertinent.

The Speed Sprayer, with its vast power, would control early season scab well and rapidly with a low man-power requirement. Special attention should be given to adjusting the machine to put more in the tree-top than is the custom. As with all fixed-outlet machines now available, it is more economical where spaces between trees in the row are small. With a one-way head, it would not be practical to spray all rows from one side with the wind, before spraying the other side.

The Silveraire air-blast sprayer would give excellent control of early season scab on moderate-sized trees. The up-and-down movement of the outlet makes rather slow driving essential, if a zig-zag coverage is to be avoided. The machine, like many others, appears, usually, to deposit more in the lower than the upper parts of the trees. It would not be practical to spray one side of the rows before spraying the other side. An excellent general appraisal of this machine by Dr. H. C. Young appeared in the November 1945 issue of the AMERICAN FRUIT GROWER.

### The Why of Dusting

A typical spray mixture for apple trees would contain about 12 pounds

of solids per 100 gallons. Thus about 55 times the weight of the ingredients we wish to deposit on the tree is used just to distribute them—a most inefficient procedure at best. Scab-control dusts may contain 95% sulfur, although part of this may be too coarse to be effective, and much of the dust floats beyond the trees we aim to cover. Nevertheless, in dusting, we do not use so much of our energy putting out inert materials as in spraying. The weight of a duster and the power to run it, are less than for liquid sprayers, so it is far easier to get through muddy or hilly orchards, and there is no need of water supply.

#### Faster Than Spraying

Dusting is faster than spraying, though the local situation and equipment determine how much faster. In our own orchards, we dust about 8 acres per hour from one side; with our 16-nozzle boom, we spray 5 to 6 acres per hour from one side with the same two men. Our tree-rows are long, our slopes gentle, our water supply convenient, and our drainage good. Occasionally, we can dust when the ground is too muddy for spraying. With larger trees, the comparison would be more favorable for dusting. The speed of dusting would be improved if the machines were equipped with larger hoppers, so delays for filling would be less frequent.

A common cause of failure of dusting is that the operator does not realize it when he fails to cover the trees. Changeable air currents deflect the dust, but the operator, looking at the tree through a cloud of dust, believes it covered. A critical observer would be able to point out such irregularities. As in spraying, a special effort should be made to cover the tops heavily. Excessively rapid movement of the outlet tube decreases the "carry" of the dust.

#### Cost of Labor

The cost of labor in dusting is low enough so there is no great inducement to work for a "one-man" machine, though such a machine would have some advantages. Fixed outlet machines are being used and investigated. Without manual operation, it is a problem to get the dust spread out enough, close to the machine, to cover both top and bottom branches, and still have force enough to carry through the tree. For small, open trees, the discharge from a regular duster has been divided among several small tubes at different heights. For larger trees, the volume of air discharged by a fixed outlet machine

(Continued on page 43)

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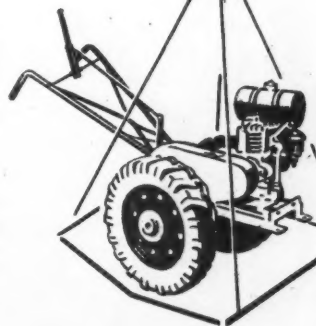
**BECAUSE** the BREADY gives you the advantage of an exclusive BREADY principle . . . *The Front Hitch*. . . It puts the burden "right across the shoulders" . . . just like the harness on a horse. . . And even though the attachments . . . the plough, the harrow, the disc, the cultivator . . . are drawn behind, . . . the BREADY actually *pushes* against the hitch . . . *at the front*.

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**Distributor — Solon, Ohio.**

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Apricots"



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**ALORCO  
CRYOLITE  
INSECTICIDE**

## EXPERIMENT STATION RESEARCH WITH DDT

(Continued from page 30)

sprayed. The winter carry-over of mites appears to be much greater on trees sprayed with this new insecticide with the result that the problem becomes progressively more serious. Tests carried on with materials such as DN-111 or summer oil employed with the DDT, suggest the mites can be held in check. Woolly apple aphid also redevelops into a serious problem where DDT is employed due to the elimination of several beneficial insects which normally keep the aphid in check. Aphid attack is associated with the spread of a very serious canker disease which further complicates DDT usage in some apple producing sections.

Because of its outstanding value as a codling moth control measure, DDT should come into the spray program. It may take one or several more years of experimental work to make its use safe and commercially practical. At this time, based upon experimental evidence of the writer and other investigators, DDT gives promise of bringing about the elimination of the calyx spray (as used for codling moth) and the reduction of cover sprays from 6 to 8, to 3 or 4 in many districts. The eradication nature of DDT, following several seasons' usage, may bring about further reduction in cover spray requirements and with it a very material saving in cash costs to say nothing about the relief in the form of general wear and tear on the grower himself.

Progress is being made. Based upon two years' investigation, the Oregon Experiment Station will recommend the use of DDT in 1946 for the control of the Pear and Prune Thrips, the Oblique-Banded Leaf Roller on raspberries, Tuber Flea Beetle and Spotted Cucumber Beetle on potatoes and the Hairy Vetch Bruchid. Further usage involves various household and live stock pests.

#### Experimental Use of DDT for Insect Control in California

By E. O. Essig and A. E. Michelbacher  
University of California, Berkeley, California

**D**URING the past two years extensive experiments in the control of insect pests with DDT have been conducted by members of the Division of Entomology and Parasitology of the University of California. Many of the most important insects have been controlled by this new and remarkable insecticide. However, some complications have arisen in connection with the attempted control of certain specific insects, which although they were controlled, others infesting the

same crop actually increased in numbers. Among these were certain aphids and particularly orchard mites or red spiders. The increase of aphids, we think, has been due to the destruction of their natural enemies and the ability of the aphid to remain in a relatively small area not contacted by the sprays or dusts. Apparently DDT is not at all effective in killing the mites. However, where DDT is combined with certain other well known insecticides these difficulties are circumvented and the aphids and mites may be readily handled. In other cases, the applications of sprays and dusts suitable for the control of these mites without DDT have been used.

However, alone or in combination with other insecticides our experimental evidence conclusively indicates that DDT should be applied at the lowest possible concentration that will give efficient and economical control of the various insect pests against which it is directed.

#### DDT Residue Tolerance

The use of DDT on edible portions of vegetables and fruits, whether intended for human or animal consumption, is limited by the residue problem. In view of the fact that there is at present no known efficient means of removing this DDT residue applied as a spray or dust, methods must be developed whereby these deposits may be reduced to quantities less than the present tentative tolerance of 7 ppm which has been established for fruits and which has been generally accepted for other edible plant materials.

Investigations in a number of cases have advanced to a point where DDT can be recommended for use in controlling certain insects on a large scale experimental basis. This is particularly true where no serious residue problems are involved. For the control of the grape leafhopper very satisfactory results have been obtained with a vapor oil spray containing 1.2 per cent DDT applied at the rate of approximately 4 gallons to the acre when the grapes are in pre-bloom condition. A 5 per cent DDT dust in sulfur has also resulted in giving good control of this insect. One and two applications of water suspension sprays containing 1 pound of actual DDT to 100 gallons of water have resulted in excellent control of codling moth on walnuts in Northern California. Where 2 sprays were applied, the infestation of nuts was practically zero. Where the sprays were thoroughly applied satisfactory control of the walnut aphid also resulted but where poor spray applications were

(Continued on page 48)

AMERICAN FRUIT GROWER

## GROWER EXPERIENCES WITH DDT

(Continued from page 16)

was reduced down to about 6 or 7 per leaf which is quite satisfactory. All arsenate of lead plots, although zinc and lime was used as a corrective, had considerable defoliation probably about 20 percent while there was no defoliation on the DDT plots even on those plots where there were 50 some odd red mites per leaf. The control of worms on the arsenate of lead sprays would have been reasonably satisfactory had it not been for the stings on the apples. Any fruit grower knows when you can get twenty stings on an apple and not have a worm in that apple you have done a wonderful job of spraying.

"A general use of DDT will increase the volume of apples by many millions of bushels in the nation. But many small sizes and green apples will be available for juice apples free of worms and should give the apple juice business a big boost. Apples are the easiest thing to put into juice as anything on the market at the present time. All that is needed is the right kind of apple to put into juice and an advertising campaign to market same."

## Lake Erie Farm

H. L. Mantle of the Mantle & Mantle Lake Erie Farm at Painesville, Ohio describes the results of DDT spraying on their fruit farm:

"We have about 180 acres of apple orchards in which we have had more or less difficulty in properly controlling codling moth—especially the past few years. When we found we could get a small quantity of DDT for experimental purposes in 1945, we made use of the opportunity and secured 1,000 pounds. Following the advice of the manufacturer and of the Ohio Experiment Station, we sprayed three separate plots—each using a variation of the spray material. Our plots were given sulphur sprays for delayed dormant, pink, and pre-pink and fermate, lead, and lime were used in the calyx spray.

"Plot No. 1 was a young orchard consisting principally of Gallia, Wealthy, Delicious, and Baltimore. It was located near the packing house where apples were quite wormy in 1944.

"Plot No. 2 consisted principally of Gallia, Cortland, Delicious, Wealthy, Baldwin, and Spy. This was a mature orchard and was located not far from the buildings. It has also been somewhat of a worm problem.

"Plot No. 3 was also a mature

orchard, consisting principally of McIntosh, Baldwin, Wealthy, and Greening. This was located at the extreme eastern end of the farm and has not been a serious worm problem.

"Plot No. 1 was given DDT formulation of 25% strength at the rate of 4 pounds for 100 gallons of water on June 10, June 21, June 30, and July 11. On July 30 in addition to 4 pounds of DDT, 1¼ pounds of DN-111 was added because of a heavy infestation of red mite that had developed. On Aug. 10 another spray with 4 pounds of DDT was given.

"Plot No. 2 was given 3 pounds of DDT, 2 pounds of arsenate of lead, and 1 pound of Fermate on June 10, June 21, June 30, July 11, and July 30 and August 10 with 1¼ pounds of DN-111 added in the spray of July 11. Plot No. 3 was given 4 pounds of DDT on June 10, June 21, June 30, and July 11. On July 30 it was given 2 pounds of Black Leaf No. 155, 1¼ gallons of summer oil and 1 pound of Fermate, and this combination was repeated August 10.

"In all plots the control of codling moth was perfect. Not a worm hole or sting could be found. On other parts of the orchard, similarly located and sprayed with standard sprays, there were a number of stings and some entrances. However, red mite was very serious in all of the DDT sprayed plots and showed very little infestation on the remaining parts of the orchard. There is now a large carry-over of red mite eggs on the twigs in the DDT plots.

"Regarding bees, we had a number of colonies located under eight trees on the south side of No. 2 plot. We avoided spraying these eight trees with DDT and used standard materials, although we used DDT on all of the surrounding trees. We were not able to detect any injury to the bees.

"Growers will observe that while DDT is effective against codling moth and a number of other injurious insects, that when it is used on apples, there must be some other control applied against red mite."

## Klenk Orchards

The Klenk Orchards, owned and operated by Otto and Erwin Klenk at Sparta, Michigan, consist of two hundred acres of orchards, the trees ranging in age from two years to thirty years. Erwin Klenk reports on the Klenk Orchards' experiment with DDT during the past season:

(Continued on page 42)

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TRUCKS AND CARS  
Easier-  
Faster-  
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## GROWER EXPERIENCES WITH DDT

(Continued from page 41)

"We were so well satisfied with our experiments," said Mr. Klenk, "that we are going to use DDT in our 1946 spray program. I would not recommend starting before the second cover spray, since it is a contact spray. I do not think it is advisable to use it before, because of the bees and other pollinators.

"For the experiment we ran in 1945, we started with the third cover on June 15. For 1945 that was early enough since the month of May and the first half of June had below normal temperatures, which makes some difference in the time when the moths will emerge.

"We ran three different experiments. The first consisted of four pounds of 25 percent DDT to one hundred gallons of water, beginning on June 15 with the third cover spray. This schedule was carried through every ten days for seven sprays, and the control was excellent. You would have to look over several trees before you could find a wormy apple.

"Experiment number two consisted of four pounds of DDT to one hundred gallons of water for four sprays—then, two pounds of DDT and two pounds of 155 to one hundred gallons of water for three sprays applied ten days apart. Apparently there wasn't any difference in these two experiments.

"In experiment number three, we used two pounds of 25 percent DDT and three pounds of arsenate of lead to one hundred gallons of water. Normally I would have said that this gave very good control since there were very few codling moth injuries. It was not as good a schedule as one and two, however.

"These experiments have proven to us that three pounds of 25 percent DDT will be used in our 1946 spray schedule. We also had good control of green aphids. From general observation, I do not think we are going to have to put on seven sprays of DDT. Possibly four or five sprays will do.

"I would advise any grower that is going to use DDT to be a bit conservative about the time he starts using DDT if there are any bees in the orchard when he begins spraying. Your bee man won't be putting bees in your orchard another year."

### Morse Orchards

Elmer F. Morse, fruit grower of Shelby, Michigan relates his experience with DDT:

"Up to about fifteen years ago I was able to grow good clean apples by using arsenate of lead in five ap-

plications. Since that time I have been gradually getting more and more codling moth damage, until now fully one-third of my apples have stings and worm holes.

"I grow from thirty to forty thousand bushels of apples in normal years but last year I had about sixteen thousand bushels. So you can see I have had up to at least ten thousand bushels of codling moth damaged apples which, had they been clean, would have paid for a lot of spray material. So I have decided to disregard the cost and go ahead and spray with DDT.

"Last June I used 360 pounds of Deenate 25W on a block of trees, mostly Wealthys. I put on six sprays at ten to fifteen day intervals using four pounds of DDT to 100 gallons of water, plus fungicide and harvested between five and six hundred bushels of apples from this block entirely free from codling moth damage. The apples colored fine and when brushed, they showed a clean bright finish I've been unable to get using other spray materials. This makes for much faster packing and I have a product not to be ashamed of on any market."

### McCormick Fruit Farms

C. R. McCormick of the McCormick Fruit Farms at Henderson, Kentucky, reports on his experiences with DDT:

"Those fruit growers in the mid-west, who have experienced in their battles with the codling moth many serious reverses, can welcome the coming season with new hope. This statement is justified by the results of experiments made with DDT during the past year on forty acres of apples in our orchard.

"We have in production 125 acres of orchard in Henderson and Union Counties, Kentucky. Forty acres of the older orchard has had a very high codling moth population for the past twelve years. By 1938 this strain of codling moth had developed so much resistance to lead arsenate that we could not continue the production of fruit with the standard lead oil program.

"The following year under the direction of Dr. L. F. Steiner of the Bureau of Entomology at Vincennes, Ind., we started a full program of tank-mix nicotine bentonite and had good results for several years. However, after using this material four years, our strain of codling moth had developed the highest resistance to nicotine of any strain tested in this section. This was shown in tests

(Continued on page 44)

AMERICAN FRUIT GROWER

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## MACHINERY FOR SCAB CONTROL

(Continued from page 39)

must be several times greater than that of the common orchard duster. It is possible that the velocity need not be so great. Flaring, or fishtail outlets, several feet long, and a few inches wide, have been employed with success against certain easily-controlled pests. It is necessary to obtain a controlled air-stream and density of dust in all parts of the outlet, and to compensate for wind. Irregularity in size, shape and spacing of trees creates problems. After the foliage has developed fully, it is difficult to drive the dust to the center of the tree, especially at the top; the placement and angle of the fixed outlet are involved in this.

### Small Volume Machines

With all dusting, the deposit may be increased by applying when the leaves are wet. Several machines in the process of development, would apply dust and liquid at the same time. The aim is to wet the dust and bring about better sticking. One group of experimental machines designed to dust or spray or do both simultaneously, may be characterized as "small volume" machines. They put out not over one to two thousand cubic feet of air per minute. In some, liquid is introduced under high pressure, through nozzles, into the air-stream from the flexible-tube outlet of an ordinary duster. In others, the liquid under low pressure from a centrifugal or other pump is broken up chiefly by the velocity of the air-stream, into which it is introduced at an angle through nozzles or perforated tubes. There seems to be some encouragement to believe that a pound of dust plus a gallon of liquid, may leave a deposit similar to that secured with 5 to 10 gallons of liquid spray. This would constitute a saving of 80% or more in weight of material to be hauled through the orchard. The mechanical problems in getting the dust wetted, and of depositing it where it is needed on leaf and fruit surfaces, may require further work. For controlling primary scab infection, these problems are less acute for reasons given earlier, than for some other pests.

### Large Volume Machines

A second group of machines that will dust or spray or do both simultaneously, may be designated as large-volume machines. One sort of experimental machine utilizes a long narrow dust outlet with nozzles

(Continued on page 45)

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Beach City, Ohio - R. D. 2

## GROWER EXPERIENCES WITH DDT

(Continued from page 42)

conducted at the Vincennes Laboratory, and should be remembered when using heavy applications of any insecticide for several years. In 1944 the mid-west had the severest codling moth condition in history, and our worm infestation, even with tank-mix, rose to 30%.

### Future Appeared Dark

"During these years we had failed to find an adequate fungicide for use with nicotine and bitter rot had increased so much that we faced disaster. Spraying cost had reached a maximum and the most efficient insecticide in use was losing ground. As an average grower in this section, when we were fast approaching a period of declining prices for poor quality fruit, the future appeared dark indeed.

"However some DDT was to be released for experimental work on a commercial scale to a number of growers. Through cooperation of the Vincennes Laboratory, a small quantity of the material was secured and a program set up by Dr. Steiner on 40 acres which was divided into six blocks and sprayed with the following treatments: (Double calyx application and 1½ covers of lead arsenate and sulfur were applied to all blocks alike—April 6th to 26th).

A. Nicotine bentonite. 9½ covers & top-off (4/30 to 8/4). 1 pt. Nic. sul., 8 lbs. Miss. bent. & Orthol K oil, 2 qts. in 6½ covers, 1 qt. in last 3.

B. Nicotine bentonite-DDT. 7 covers (4/30 to 7/24). 1 pt. Nic. sul., 8 lbs. Miss. bent. in 2 covers, ½ pt. nic. & 5 lbs. bent. thereafter. 1½ lbs. Deenate in all sprays & Orthol K oil, 2 qts. in 5 covers, 1 qt. in last 2.

C. Lead arsenate-DDT. 7 covers (4/30 to 7/24). Lead arsenate 4 lbs. in 2 covers, 21 lbs. in 3rd; weak bordeaux in all except 7th spray, Deenate 1½ lbs. in 3 sprays, 4 lbs. in 4 covers, Orthol K oil, 2 qts. in 6 sprays, 1 qt. in 7th.

All check counts were made by the staff from the Vincennes Laboratory. Below is the summary of the final checks made on August 21st and September 5th.

"In the tank-mix nicotine blocks

we picked off all wormy fruit possible at the end of the first brood. This was unnecessary in any of the DDT blocks because those areas had only one worm for every 5000 apples on June 19th. Fewer DDT sprays might have been required if all blocks had not been adjoining, then moth migration would have been impossible from the nicotine areas.

"We had severe foliage injury in C areas occurring immediately after the final cover of DDT and oil which was applied under very hot, humid conditions. The extensive use of oil in these areas was for control of mites and red spider and with good results. However we now know that very little oil can be used with DDT. The excessive deposit of DDT built up by oil is prohibitive under the tolerance set by the Pure Food and Drug Act. It is our hope that much work will be done by research departments on mites and red spider the coming season.

"The finish of the fruit and the condition of foliage in the nicotine-DDT blocks was excellent and this combination appears to be the safest where bitter rot is under control.

"Even though our enthusiasm is justified it must be tempered with caution. Many of the answers we seek concerning DDT will be found only through the experiences of individual growers in their orchards, but failure to consult your state or federal entomologists may prove very costly."

### Fulton Orchards

Stanley M. Fulton of the Fulton Orchards at Hancock, Maryland, treated about 2,000 trees last August 15 with DDT for the control of the Peach Borer. Mr. Fulton used a concentration of 2 lbs. of actual DDT per 100 gallons of water. This material was applied with a power sprayer carrying about 150 lbs. of pressure, with single nozzle guns. About ½ gallon per tree was applied on older trees. Mr. Fulton found that ½ gallon of material would thoroughly soak the trunk of the tree and the ground around the tree trunk.

(Continued on page 46)

			Crop	No. per 100 apples	
				Worms	Stings
Paired Blocks	A-1	Jonathan-Winesap	Full	4.6	4.2
	C-1	Grimes-Winesap	Full	0.4	1.4
Paired Blocks	B-1	Stayman-Winesap	Moderate	1.4	2.6
	C-2	Stayman-Winesap	Moderate	0.2	0.8
Paired Blocks	A-2	Grimes-Red. Del.-Stayman	Moderate	5.8	7.1
	C-3	Grimes-Red. Del.-Stayman	Moderate	0.3	1.0

## MACHINERY FOR SCAB CONTROL

(Continued from page 43)

mounted along its edges (see picture on page 19). There is reason to believe that such machines will evolve into something useful. Many problems, such as the size, shape and angle of outlet, the volume and velocity of air, and the composition and atomization of the liquid require extensive investigation.

Within a few years, the service of airplanes and helicopters may be generally available and may find a place in scab-control applications. This job may not be easy since comparatively heavy deposits on each leaf and fruit, are required for continued protection.

High velocity dusting machines adapted to atomizing concentrated insecticides, dissolved in oil, require extremely little liquid to cover. Other atomizers, utilizing compressed air, are under test. However, concentrated fungicides suitable for this method of application are not available at present.

It is inevitable that the first models of machines employing new principles will be imperfect, but changes from our present equipment are sure to come. Fruit growers probably will play an important part in these developments. An all-purpose machine would have to be capable of depositing the materials on upper and lower surfaces of leaves, and all around the fruits. If this article stimulates you to think of some way to improve your own practices, it will have served its purpose.

## STATE NEWS

(Continued from page 28)

**MINNESOTA**—William A. Benitt of Hastings was elected president of the Minnesota Fruit Growers Association at the annual meeting on October 24. Al. Loffelmacher of Fairfax was re-elected vice president and J. D. Winter, secretary-treasurer. These officers are elected for 2 year terms. Mr. Benitt also becomes ex-officio a member of the executive board of the Minnesota State Horticultural Society.

Directors of the association elected for three years were A. P. Bremer of Lake City, D. T. Grussendorf of Duluth, and John L. Westrum of Excelsior.—J. D. Winter, Secretary, Minnesota Fruit Growers Association, Mound, Minnesota.

**OHIO**—The Ohio State Horticultural Society held its 79th Annual Meeting in Cincinnati, Ohio on February 6 and 7. "Looking Ahead" was the theme of the meeting which brought to growers results from recent research work in improving production and marketing practices and gave them the viewpoints of successful commercial growers, as well as state and national authorities.—Frank H. Beach, Secretary, Ohio State Horticultural Society, Columbus, Ohio.

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range . . . the exact and constant pressure you require.

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From where I sit ... *by Joe Marsh*

## Keeping 'em Down on the Farm

Rode out to the Jenkins farm the other day—and there was young Charlie Jenkins—two months out of uniform—driving a tractor as pretty as could be with his one good arm.

"I expect you find that pretty dull after piloting a bomber," I suggested.

Charlie gives me a wide, contented grin. "Dull?" he says. "All the time I was over Germany I dreamt of this—the smell of hay, and the hot sun on my back...and comin' home

to women's voices in the farmhouse, and home cookin', and a friendly glass of beer. No," he says dreamily, "not dull!"

From where I sit, that's how lots of returning veterans must feel. Yearning for excitement? No, just mighty glad to be back with the old familiar things, the day's work, the rewards of home, companionship and simple pleasures. No...not dull.

*Joe Marsh*

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- ☐ Open Road (Boys).....6 mos.
- ☐ Outdoors.....6 mos.
- ☐ Parents' Magazine.....6 mos.
- ☐ Pathfinder (Weekly).....1 yr.
- ☐ Poultry Tribune.....2 yrs.
- ☐ Protestant Voice.....6 mos.
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## GROWER EXPERIENCES WITH DDT

(Continued from page 44)

A check was made in November in the Fulton orchards, and Mr. Fulton does not consider the control effective. He says, "There may have been something wrong with our timing or the concentration, since I understand some checks have received better control than the conventional Bor-tox."

### Consolidated Orchard Company

Henry W. Miller, Jr., Vice-President of the Consolidated Orchard Co., at Paw Paw, West Virginia, has the following to say about his experience with DDT in 1945:

"Most people believe that the days of great miracles were over many years ago and that no living people of today would ever see a first class miracle. This belief was shared by the writer until my 1945 experience with DDT.

"In February 1945 the board of directors of Consolidated Orchard Company met in special session to decide on a spray program for the coming season. After a full and most solemn discussion, we unanimously agreed to use DDT, provided it could be obtained and applied under the direction of our State Entomologists, Gould and Sherwood. We were desperate because of a terrific carry-over of moths from the long summer drought of 1944.

"The Company's bearing trees cover approximately one thousand acres, but after a serious May 4th freeze, it was necessary to spray only 800 acres, which had a fairly light remaining crop that would ordinarily be almost impossible to protect from worms in this area. A heavy population of over-wintering moth and a light apple crop is a bad combination.

"It is entirely unnecessary for me to elaborate on the seriousness of our situation in May 1945. Barring some act of God like zero weather in July, we were headed for a crop of culls. Because of this crisis we did not hesitate to use the new and comparatively little known chemical, DDT, as soon as it could be obtained.

"Our many difficulties in securing DDT to spray 800 acres is another story. Most entomologists kindly heard our story but sagely advised us to wait a few years. The War Production Board was sympathetic but they had a war to win and could not understand how such little worms could destroy such food.

"Certain big chemical companies seemed anxious to see DDT tried on

(Continued on page 47)

AMERICAN FRUIT GROWER

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**E-Z-C Protector**  
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Tear-off  
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SMITHVILLE, TENN.

## GROWER EXPERIENCES WITH DDT

(Continued from page 46)

a commercial scale but washed their hands of any responsibility, in terrifying language on each package. These necessary but untruthful notices caused many of our employees to hesitate to handle DDT until those of us managing the job proved, by prolonged physical contact, that even the raw powder could be handled without the least discomfort or effect. Our men soon learned that DDT is as pleasant to apply as pure water and about as harmless.

### Answers Practical Questions

"I know that many apple men are now tremendously interested in DDT and that they have many hitherto unanswered, practical questions in their minds. Because of this I am going to list here some most likely questions and answer them to the best of my ability, from our experience in 1945.

**Question:** How long is a DDT application effective against codling moth?

**Answer:** We found that the first application was deadly for only about two weeks but that each later application seemed to last longer than the preceding one, indicating that there was a build-up.

**Question:** Is DDT more effective when lead is added?

**Answer:** DDT was just as effective by itself as with lead in our orchards.

**Question:** Does DDT need a spreader or sticker?

**Answer:** We found that it seemed to spread better and last a little longer when used with one quart of summer oil per hundred gallons.

**Question:** Does DDT injure foliage?

**Answer:** We do not believe that it does unless excessive oil or bluestone is added. Our foliage was generally in a fine, green condition at harvest time.

**Question:** What is the effect of DDT on size and color?

**Answer:** Our size was normal for the season and the color and finish better than normal.

**Question:** Is there a greater danger of being attacked by red mite where DDT is used?

**Answer:** Yes. Red mite built up in some areas of our orchards at a fast rate but we were able to stop them with a straight application of 5 quarts of summer oil to 100 gallons of water. Comparatively cool days were selected for the application.

**Question:** How many applications

(Continued on page 51)



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## OUR DDT STICKS TO FOLIAGE CCC DDT

in 3%, 10%, 25%, 50%

Equally important with the DDT is the carrier. Will it, with its DDT, adhere to the foliage, or will it quickly be blown off or washed away by rain?

In CCC DDT we give you a mineral which has a natural adhesiveness that causes it to stick through wind and ordinary rain.

This superior quality adhesive mineral (it is not a lime) is from our own mines at Natural Bridge. It is ground extremely fine (99% through 325 mesh screen) and our DDT mixtures remain in perfect suspension in the tank and will not clog sprayers.

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## EXPERIMENT STATION RESEARCH WITH DDT

(Continued from page 40)

made serious aphid infestations later developed.

DDT used as water suspension sprays or as a 5 per cent dust has resulted in very good control of the onion thrips on onions. Outstanding control of lygus bugs on alfalfa seed crops has also been obtained by properly timed 4 and 5 per cent DDT dusts used at the rate of 30 pounds to the acre. In some cases the seed yield was increased by more than 100 per cent over the untreated check. Four or 5 per cent DDT-sulfur dusts have proven very effective in controlling these bugs on cotton and beans. DDT dusts have proven to be very effective against the pea aphid and thrips attacking cotton seedlings.

### Other DDT Uses

Another very important and free use of DDT has been for the control of flies in dairy barns and other structures housing livestock. The increase in milk production and in sanitary conditions were so phenomenal that many of the large dairy companies provided for the treatment of the barns, milkhouses, and other structures of farmers supplying milk and other dairy products.

The use of DDT on an extensive experimental and commercial scale on many crops, including most fruits and vegetables, is as indicated above, greatly limited by the residue problem. The insecticide has been found to be very effective in controlling codling moth on apples and pears, and in subjugation of other caterpillars attacking other deciduous fruits. It has also given excellent control of many of our most important truck crop insects including the corn earworm, leafhoppers, cucumber beetles, cabbage worms, tomato pinworm, potato tuber moth, beet armyworm, and others too numerous to mention.

There are some agricultural pests against which DDT has not been found to be effective. These include the woolly apple aphid, the cabbage aphid, the melon or cotton aphid, red spiders, and blister mites and bud mites.

Although rapid progress has been made and much useful information has been gathered concerning the use of DDT in the control of agricultural pests we feel that a great deal more investigational work is needed before the exact position of this insecticide may be established in the pest control program. There are many factors yet to be looked into and we are recommending the material only where it may be used safely to plants and to animals and human beings.

**DDT Research in the Northeast**  
By J. E. Dewey  
New York State College of Agriculture

**T**HROUGHOUT the northeastern states, DDT is hailed by entomologists and fruit growers alike, as the best insecticide known for the control of Codling moth. Research workers of the northeastern experiment stations find one pound of actual DDT in 100 gallons of water to be superior to present schedules using lead arsenate and nicotine, oil or phenothiazine. For good control, you should use three-fourths to one pound of toxicant in 100 gallons of water. Even with DDT, thorough applications are necessary every 10 to 14 days. Grower demonstrations emphasize the necessity of adequate and thorough coverage throughout the season. Severely infested orchards which were well sprayed gave almost perfect control in contrast to about 70 percent control in lightly infested but poorly sprayed orchards.

Unfortunately, Codling moth is not the only problem of the apple grower in the northeast, and DDT is not a "cure-all". According to counts made, European red mites seem to thrive on DDT in many areas and have caused much damage. Other minor pests have become of increasing importance. Sometimes the Two-spotted mite and Red spider increase in great numbers in DDT blocks. The Woolly apple aphid was found to increase in Pennsylvania, while Mealy bug increased in great numbers in an experimentally sprayed orchard in New York. To control Plum curculio, you will have to combine lead arsenate with DDT since DDT alone must be used in large quantities to be effective. Some experimental results do not indicate it to be as effective as lead arsenate in controlling Apple maggot. However, when used in at least three cover sprays during maggot emergence good control was obtained in New York experiments.

So far, DDT seems to be compatible with most commonly used fruit spray materials. Occasionally, the addition of oil to DDT sprays has produced injury to the foliage with little or no gain in control efficiency. Oils also greatly increase the amount of DDT residue at harvest-time. Little or no trouble is expected in conforming to the tentative tolerance of 0.05 grains per pound of fruit when DDT is used without oil. Chemical analyses of fruit sprayed experimentally with one pound of DDT in six applications were just under the tolerance.

(Continued on page 51)

**AMERICAN FRUIT GROWER**

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# CAMERA at the INDIANA and ILLINOIS STATE MEETINGS



Above left—The 1945 winners of the Indiana Quality Plus Apple Club award at the Indiana meeting: (left to right) W. W. Doud, Denver; Robert A. Simpson, Vincennes; W. J. Teel, Owensville.

Above right—Laurenz Green, Head of Purdue University's Department of Horticulture, talks with L. Doud (right) one of his former students and Vice President of the Indiana Horticultural Society.



K. I. Fawcett, Sec'y of the Indiana Society (left) visits with Herbert Garrard of American Potash Institute.



Speakers on the Illinois program: (left to right) E. J. Rasmussen, Michigan State College; R. H. Roberts, University of Wisconsin; M. J. Dorsey, University of Illinois.

At the Illinois Meeting: S. C. Chondler (left) and R. L. McMunn of the University of Illinois.



At the annual meeting of the Illinois State Horticultural Society, grower D. P. Dell, Grafton, Illinois (right) tells C. H. Eckert, Belleville, Illinois how he operates his 500-acre orchard.

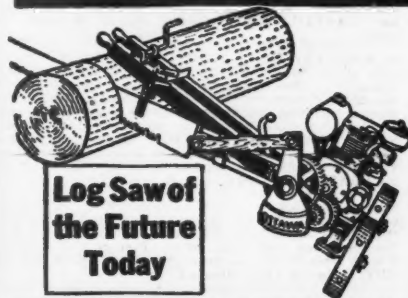


At the Indiana meeting: (left to right) Robert H. Daines, N. J. Experiment Station; C. L. Burkholder, Purdue University; L. F. Steiner, U.S.D.A. Station, Vincennes, Ind.; Don Wilson, Carlisle, Ind.

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AMERICAN FRUIT GROWER

**GROWER**

# Ramblings

## OF A HORTICULTURIST

IT'S a brisk winter day. The boughs of the orchard trees bend under the weight of the heavy snow and all is white and sparkling. It is quiet and peaceful save for the creaking trees as they sway gently to and fro in the soft icy breeze and for the gay chirping of the Titmice and Chickadees. The orchard stands on the hilltop, bare of the green of spring, but masculine-like and peaceful as it rests beneath the great white blanket of nature.

'Tis truly a day of paradise, and one which we northerners love. We like it for many reasons, but for one in particular. Today we can recline in the comfort of our living rooms, look out upon the panorama of winter scenes and then turn our attention so easily to thoughts of gaiety of spring. Most of us weathered northerners who live close to the good earth and love to work with it habitually look forward to this day.

Among other things, we go to the stack of magazines and catalogues which have accumulated into quite a pile through the year and we dig down till we find those fabulously illustrated nursery catalogues. We pile them down by our easy chair and peruse them one by one from cover to cover. All day long we read about this and that variety of fruit and marvel at the dazzling pictures of each.

As we devour the richness of the catalogues' contents, we begin to get sprightly thoughts about spring and can see those very pictures growing in our own orchards. Yes, the catalogue slips unnoticed from our hands as thoughts venture into the realm of dreams. We dream of this apple or that peach or berry growing in our own orchard. In fact, we almost reach out and go through the motions of picking them. As the imaginary flavors touch our sensitive taste buds, the saliva begins to flow more freely and a subconscious smile of satisfaction spreads across our faces. Lazily we turn our heads from the warm comfort of the glowing fireplace and our thoughts are frozen by the blustery February day that meets our vision through the large bay window. Our dream is suddenly arrested by the facts of reality, but it was pleasant while it lasted.



While we may dread the snowy, winter day and its treacherous footing, yet it is a day of enchantment for one who strolls thoughtfully through the orchard. Even the humble dog is alert to the adventures that may come from such a ramble amid nature's wonders.

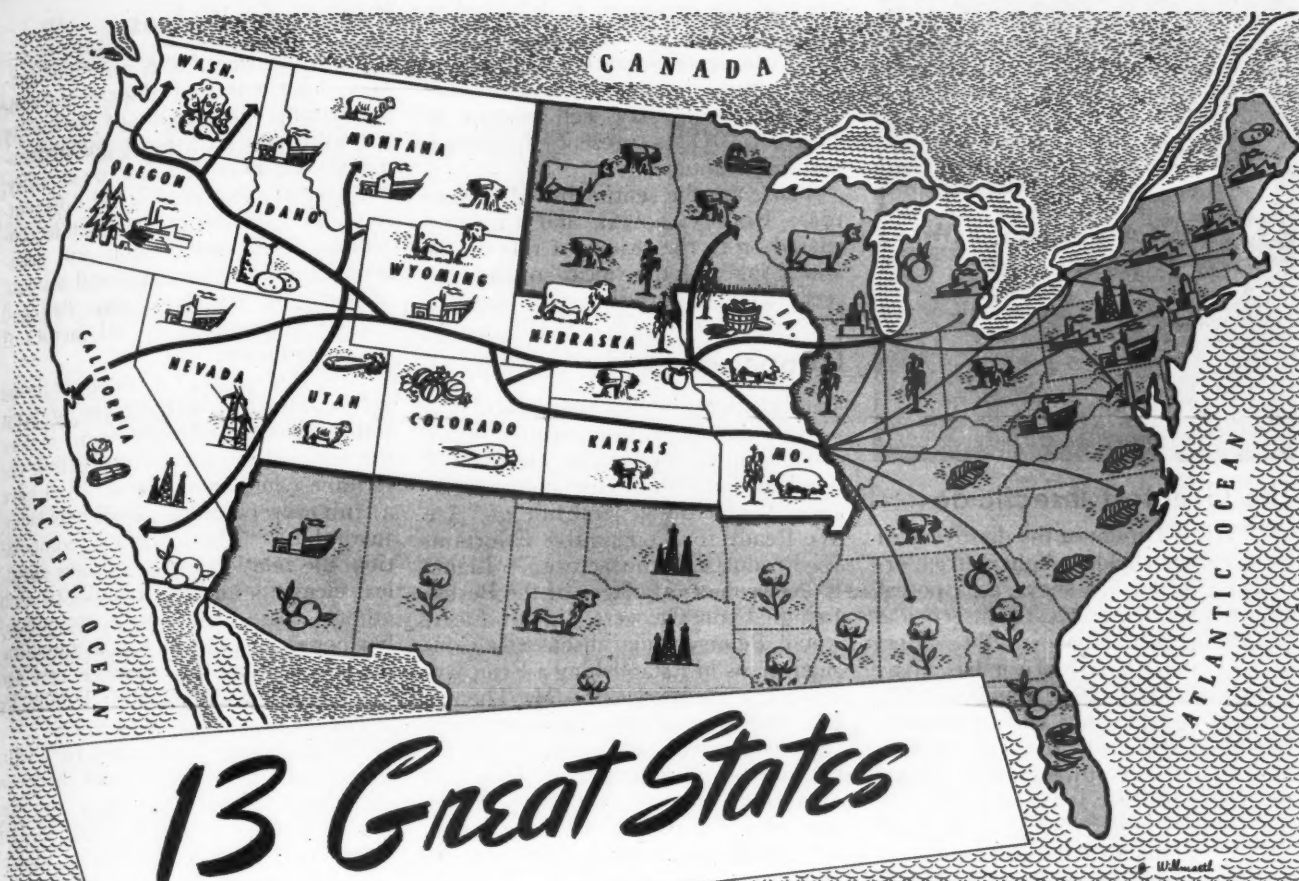
Now we can go back to reading our nursery periodicals and perhaps with more realistic ideas. By the way, this is the time each one of us should be thinking about our fruit plantings for next spring, whether it be a little "Garden of Eden" or a great planting to "feed the world". And you should be studying the descriptions of varieties in your favorite nursery catalogue in order to replenish your knowledge about the different varieties available. Even you commercial fellows can afford to do this once in awhile as well as can the home gardener. Of course, you know too that you can supplement your information by writing to your Agricultural Experiment Station, talking with your County Agricultural Agent or by writing to AMERICAN FRUIT GROWER. I mention these sources for you who really want to learn a lot about fruit varieties.

There are two essentials in approaching any problem, or every problem. First, you must be stimulated by the problem to such an extent that you will do something about it. Second, you must then arm yourself with the

necessary facts and ideas so that you can do something about it intelligently. Whether you are trying to solve the problem of international peace or the humble question of which variety of strawberry to plant in your garden, these same fundamentals hold true. Readers of this magazine should be, and I think are, the best fruit growers in the country (or in the world if you like) and so should have their thinking and imagination stimulated.

We are told that the variety is the cornerstone (some may think it the tombstone) of American horticulture, so why not let ourselves be stimulated just a little bit about the matter of varieties, whether amateur or professional in our horticultural attitudes.

Now that I have preached my little sermon and you have been kind enough to stick with me until the end, you can go back to your nursery catalogues and sip greedily of their essence of beauty and inspiration. After all, unless we really get something out of this business of fruit growing that tickles our joys and gives us a serene sense of satisfaction, we can never amount to much in it.



Above map does not attempt to show all products available in the various states

For more than 75 years, Union Pacific has served thirteen western states . . . been a partner in their development.

This vast territory might well be called both the treasure-chest and bread-basket of the nation. In addition to its great wealth of industrial raw materials, a boundless supply of foodstuffs is provided by its farms, ranches, orchards and fisheries.

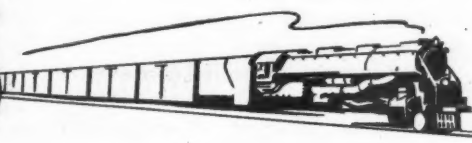
For example, in California, the Pacific Northwest, and in many states in mid-west Union Pacific territory, there is a large source of supply for the fruit and vegetable industries. Union Pacific has the equipment and personnel to meet all the requirements of shippers in those regions. The railroad spe-

cializes in efficient service for the shipment of perishables in P.F.E. refrigerated cars.

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*The Progressive*

**UNION PACIFIC RAILROAD**

*The Strategic Middle Route*

## EDITORIAL PAGE



E. G. K. MEISTER  
Publisher

J. H. GOURLEY  
Associate Editor

### The Greatest Insecticide

WITHOUT a doubt the discovery of the chemical Dichlorodiphenyltrichloroethane, DDT for short, as a potent insecticide is the greatest in insecticidal history. It is not, however, the perfect or ideal insecticide since it has many limitations and disadvantages. The subject of DDT was such a momentous one throughout the year 1945, as applied to horticulture, that the editors of *AMERICAN FRUIT GROWER* thought it a proper thing to bring to its readers the summary of the past year's experiences with this new material—and to set the pace for its use during the coming year. Hence, the reader will note a great deal of space in the preceding pages has been devoted to this all-important subject.

The remarkable quickness and thoroughness with which DDT kills many insects is indeed astounding. The results of both experimental workers and fruit growers, reported in previous pages, point the way to more intensive and wider use of DDT, but with caution. This chemical has not been in use long enough or under wide enough variations to adequately and conclusively state its exact behavior. All the insects against which it will work effectively are not known, nor do we have the knowledge of its complete effect upon the person using it. Nor do we know to what extent the wide use of DDT will disturb the normal balance of nature.

But it is a powerful weapon in the hands of fruit growers and particularly when used against the number one apple enemy, codling moth. In controlling this pest, DDT has found its greatest use in present fruit growing. For this fruit growers should be thankful. It has proven effective against many other orchard insects and not so effective in controlling others.

When DDT has been perfectly fitted into the orchardist's spray program and succeeds in helping the grower produce and place on the market the kind of an apple or peach or other fruit that he likes to sell and

the kind the consumer is delighted to purchase, then we can rightfully proclaim it an epoch-making discovery in horticultural history. It begins to look as though this may well be true in spite of DDT's present limitations and disadvantages.

These are the sentiments of *AMERICAN FRUIT GROWER* and they are passed on to the reader of this magazine along with the "meat" of the subject contained in the previous pages.

### Cooperatives

THE cooperative processing plant was a lively and interesting subject under discussion at the recent meeting of the Maryland State Horticultural Society. Under the general title of "Are We Ready for Cooperative Efforts in By-Products Manufacture?", Lionel E. Newcomer, Manager of the Berks-Lehigh Fruit Growers, Inc. of Fleetwood, Pennsylvania, discussed "Considerations in Establishing a Fruit By-Products Plant" and S. M. Thompson, President of the Baltimore Bank for Cooperatives in Baltimore, Maryland, informed listeners on "How Cooperatives are Organized and Financed." The things said at this meeting appeared to be pretty high notes in sound economy.

In view of the fact that the years to come may bring abounding yields of apples and peaches in particular, foresighted growers are thinking of solving their own problems by processing a portion of those prospective large crops. A healthy cooperative processing plant in a rich fruit growing area would certainly be of great advantage to the growers.

At the Maryland meeting, speakers urged growers to study the most successful cooperative plant nearest them if they are contemplating the construction of a cooperative plant of their own. This is an essential of the thorough planning necessary for a successful cooperative. Growers must familiarize themselves with the work and problems involved.

As further brought out by the discussions, the area in which the plant is to be built must be able to supply in normal years sufficient fruit to keep the plant operating at all times during the year. What fruits are to be processed and what products are to be made should be decided before beginning construction of the plant.

Financing the projected cooperative plant requires careful planning if success is to be achieved. A suggestion, and a good one, was that the growers themselves put at least fifty percent of the money into the plant to get it started. This tangible interest makes for success. The remainder of the money might be borrowed from the Bank for Cooperatives.

### Keys to Fruitfulness

THE orchardist, like any husbandman, deals with two fundamental considerations, the heredity of the variety and all of the factors of the environment. We do not change the heredity, but heredity expresses itself differently under different environmental conditions. Soil composition and moisture, humidity, intensity and amount of sunlight, length of day, day and night temperatures, are all factors of the environment.

But just as all of these external factors affect growth, flowering, fruit setting, and fruit development, so does the internal chemical composition determine whether or not we shall have a fruit crop (weather conditions being favorable). The chemical composition, the relationship of certain chemical elements and compounds to each other, the occurrence of phytohormones as directives in metabolism, are all vital to the outcome and are being understood more and more by scientists and orchardists alike.

We are chiefly concerned here with the relationship or balance between carbohydrates and nitrogen and the presence of excesses or deficiencies of either or both. A reasonable understanding of this concept has become one of the chief tenets of our faith.

Simply stated, it means that a fruit tree which is high in carbohydrates (sugars, starches, etc.), and with adequate but not excessive organic nitrogen, is fruitful. One with high carbohydrates but low nitrogen content (as a neglected apple tree standing in sod), or one with high nitrogen but low carbohydrate content (such as a shaded tree or one whose foliage has been badly injured), is unfruitful even though it may blossom.

In a year like 1945, when no crop was produced in many orchards, there should have been a heavy bloom and crop if the foliage was in good condition. But where foliage was injured few flower buds were formed and even leaf buds were weak. In situations of the first case, the trees should receive light applications of nitrogen, if any, so that an excessive crop will not set. In the latter situation, the application might well be delayed until mid-May.

Now the fact that the orchardist has considerable control of this matter, that he can fertilize or withhold fertilizers, prune, spray, thin, ring a tree if necessary, gives us a much more intelligent approach to our problems than a few years ago when man only speculated as to why a tree was vegetative or fruitful. Thus has horticulture made progress.

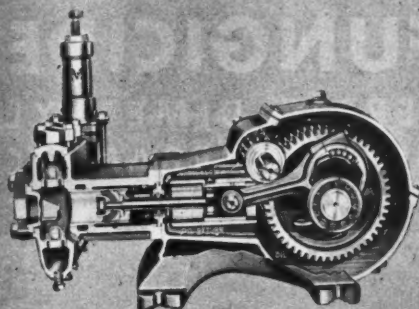
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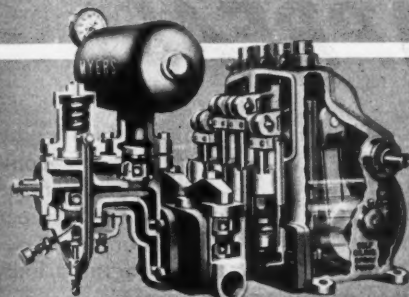
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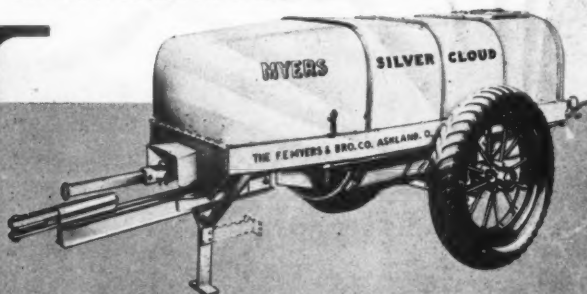
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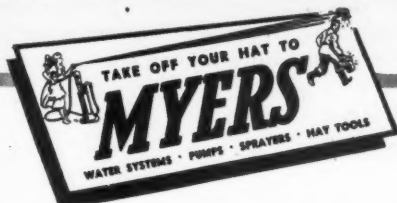
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